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Air Force Low Altitude Flying Operations

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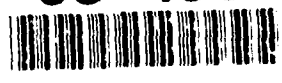

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VOLUME III

CASE STUDY SITES: RESOURCE DESCRIPTIONS AND ENVIRONMENTAL IMPACTS

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ACRONYMS AND ABBREVIATIONS

AGL	above ground level
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CO	carbon monoxide
E	Endangered (species)
EPA	(U.S.) Environmental Protection Agency
ft	foot or feet
GEIS	Generic Environmental Impact Statement
IRs	IFR Military Training Routes
km	kilometer
Ldn	Day-night adjusted average noise level
min	minute
MOA	Military Operations Area
mph	miles per hour
MSL	mean sea level
MTR	military training route
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NDW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act of 1969
NORA	Nevada Outdoor Recreation Association
NYDAM	New York State Department of Agriculture and Marketing
ORNL	Oak Ridge National Laboratory
PSD	Prevention of Significant Deterioration
RAs	Restricted Areas
SAC	Strategic Air Command
SO_2	sulfur dioxide
sq. mile	square mile
STRC	Strategic Training Range Complex
T	Threatened (species)
TAC	Tactical Air Command
TSP	total suspended particulates
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VRs	VFR Military Training Routes

INTRODUCTION

INTRODUCTION

The case study approach was selected as a realistic and necessary means of evaluating the environmental impacts occurring under the Air Force's low altitude airspaces. Twelve airspaces were selected to provide an indication of the range of impacts that can occur from low altitude flying operations. Three important characteristics of airspaces and associated flight operations went into the case study selection process. First, at least two of each of the five types of airspace under consideration—IFR Military Training Routes (IRs), VFR Military Training Routes (VRs), Slow Speed Low Altitude Training Routes, Military Operations Areas, and Restricted Areas—were included in the sample assessed. Second, the major Air Force commands engaged in low altitude flying were represented, with the larger commands—Tactical Air Command (TAC) and Strategic Air Command (SAC)—having more than one airspace assessed. This process served as a surrogate for the type of aircraft. Lastly, the case studies were selected to ensure a fairly even geographic distribution throughout the United States, including Alaska.

The first step in selecting the case study airspaces was to create a randomly ordered list of all IRs, VRs, SRs, MOAs, and RAs, indicating the military command responsible for scheduling the use of each airspace. Each airspace was then considered in turn. To be selected, an airspace had to contribute to the desired mix of characteristics. As soon as the preferred number of a particular type of airspace was chosen (e.g., IRs, VRs), this type of airspace was no longer considered. Similarly, once the requisite number of military commands was represented, airspaces controlled by these commands were ignored in selecting the remaining case studies. Finally, once a given geographic region of the country was represented, all other airspaces from this same region were disregarded.

The 12 airspaces chosen cover parts of 17 states. Seven of the case studies are located east of the Mississippi River and five are in the west (Table A.1). Figure A.1 shows the location of each of the airspaces (excluding Alaska) selected.

Table A.1. Airspaces selected for case study assessment

Airspace	MAJCOM	Aircraft type	States
IR-700	Strategic Air Command	Bombers	New York
IR-474	Strategic Air Command	Bombers	Wyoming, Montana, Nebraska
SR-300	Military Airlift Command	Transports	California, Nevada, Oregon
SR-771	Air Force Reserve	Transports	Wisconsin
VR-162	Air Training Command	Trainers	Oklahoma, Texas
VR-1679	Air National Guard	Fighters	Illinois, Indiana, Kentucky
VR-245	Tactical Air Command	Fighters	Arizona
Gamecock C MOA	Tactical Air Command	Fighters	South Carolina
Tyndall MOA	Tactical Air Command	Fighters	Florida
Yukon MOA	Alaskan Air Command	Fighters	Alaska
R-6002	Tactical Air Command	Fighters	South Carolina
R-2905	Tactical Air Command	Drones	Florida

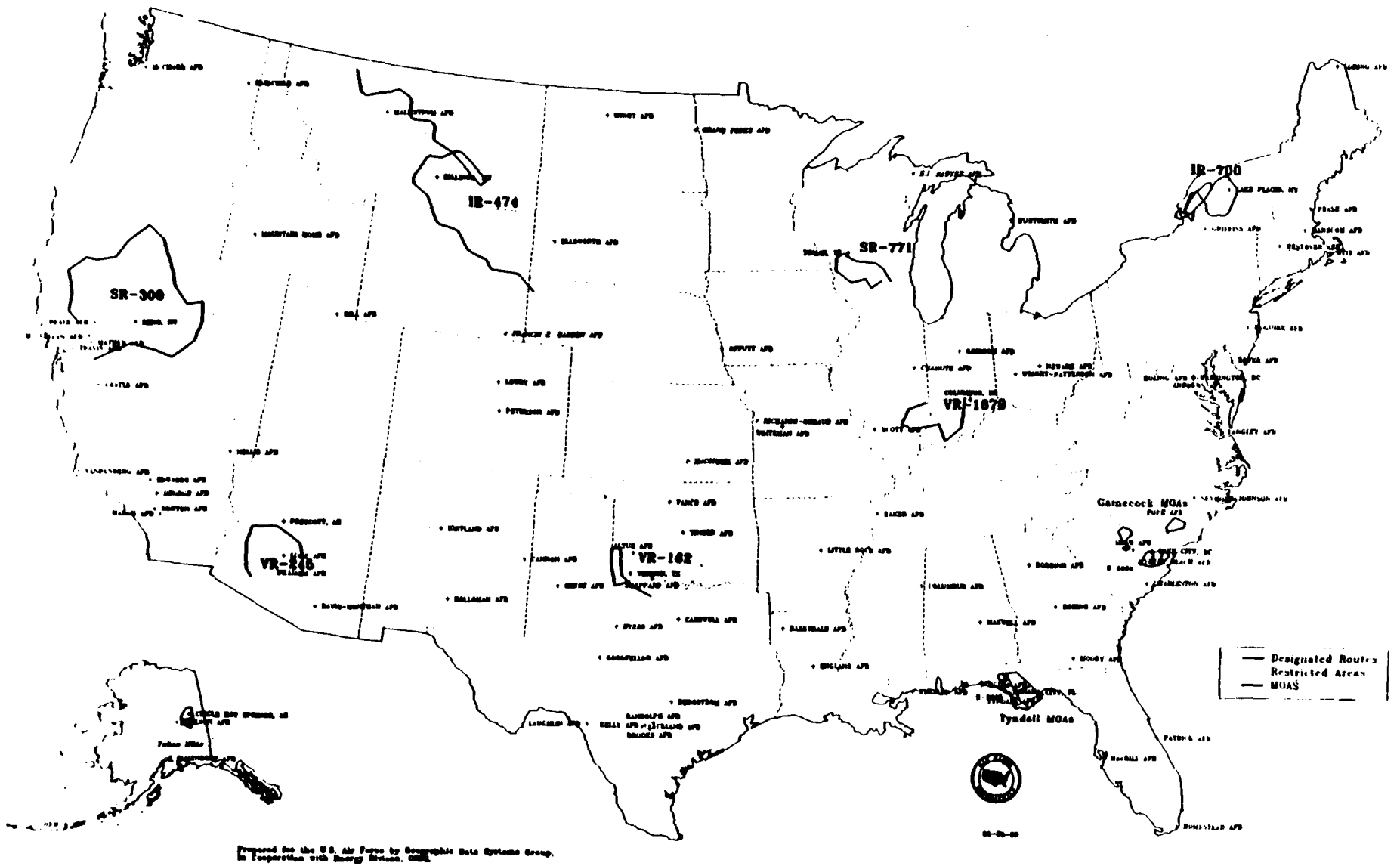


Fig. A.1. Airspaces selected for case study analyses.

In order to test the representativeness of the airspace selected for case studies, the average scheduled number of sorties and population densities under the case study airspaces were compared with the total airspace and the figures were quite similar.

The case study airspaces were analyzed in considerable depth to identify the nature and magnitude of the environmental impacts on resources sensitive to the Air Force's low altitude flying operations. Site visits by environmental professionals representing appropriate disciplines, interviews with knowledgeable public officials and representatives of private groups, and appropriate secondary data were used. Findings from generic resource assessments also were incorporated in the case studies, as necessary. As a result, the case studies provide useful information about actual site-specific impacts that result from the Air Force's low altitude flying. The noise environments for the case study MOAs and RAs were described using the L_{dnmr} metric as flight operations could be modeled similar to military training route type activity. Table A.2 indicates the presence or absence of a resource under each case study airspace.

Table A.2. Presence (+) or absence (-) of potentially affected resources under case study airspaces

	Resources						
	Human population	American Indian population	Structures	Wilderness	Wildlife	Livestock and poultry	Air quality*
Case studies							
IR-700	+	-	+	+	+	+	+
IR-474	+	+	+	-	+	+	-
SR-300	+	+	+	+	+	+	-
SR-771	+	-	+	-	+	+	+
VR-162	+	-	+	-	+	+	+
VR-1679	+	-	+	-	+	+	+
VR-245	+	+	+	+	+	+	+
Gamecock C MOA	+	-	+	-	+	+	+
Tyndall MOA	+	-	+	-	+	+	+
Yukon MOA	+	+	+	+	+	+	+
R-6002	+	-	+	-	+	+	+
R-2905	-	-	-	-	+	-	+

+ = Presence of potentially affected resource
- = Absence of potentially affected resource
* Indicates whether a case study area includes non-attainment areas as defined by the National Ambient Air Quality Standards (-) or not (+).

A. IR-700 (NEW YORK)

A.1 AIRSPACE

IR-700 is a Strategic Air Command MTR and one of the few that SAC operates in the eastern United States (Fig. A.1.1). Established on February 7, 1966, IR-700 is scheduled from Offutt AFB, Nebraska, and lies within the Adirondack Highlands region of northeastern New York in the general area of the Adirondack State Park. The low altitude segments of IR-700 pass over 10 counties in upper New York from the southeastern edge of Lake Ontario east to the state line and north to the St. Lawrence River. The route passes over the eastern portion of the Adirondack Mountains, the less mountainous western portion of the Adirondack province, and the St. Lawrence Valley. Many resorts are situated on the shores of small mountain lakes in the area. The terrain beneath IR-700 generally consists of low mountains with an abundance of tree cover and geological features that restrict visibility from the ground.

IR-700 was established to provide training for SAC aircrews at low altitude, between the earth's surface and 17,000 ft mean sea level (MSL). The route's width varies from 8 to 9.2 statute miles along a distance of 248.7 miles, covering an area of 2,244 sq. miles IR-700 can be scheduled 24 hrs/day, 7 days/week.

IR-700 is available for Air Force use at all times, but SAC typically schedules and conducts between 1 and 2½ hrs of operation daily. The SAC aircraft fly 85% of the sorties within 2 miles of the route's centerline and 94% within 4 miles. As is usually the case with its eastern routes, SAC more often flies the FB-111 than its large bombers on IR-700. The average number of sorties by aircraft type, per month, scheduled in 1986 on IR-700 was as follows:

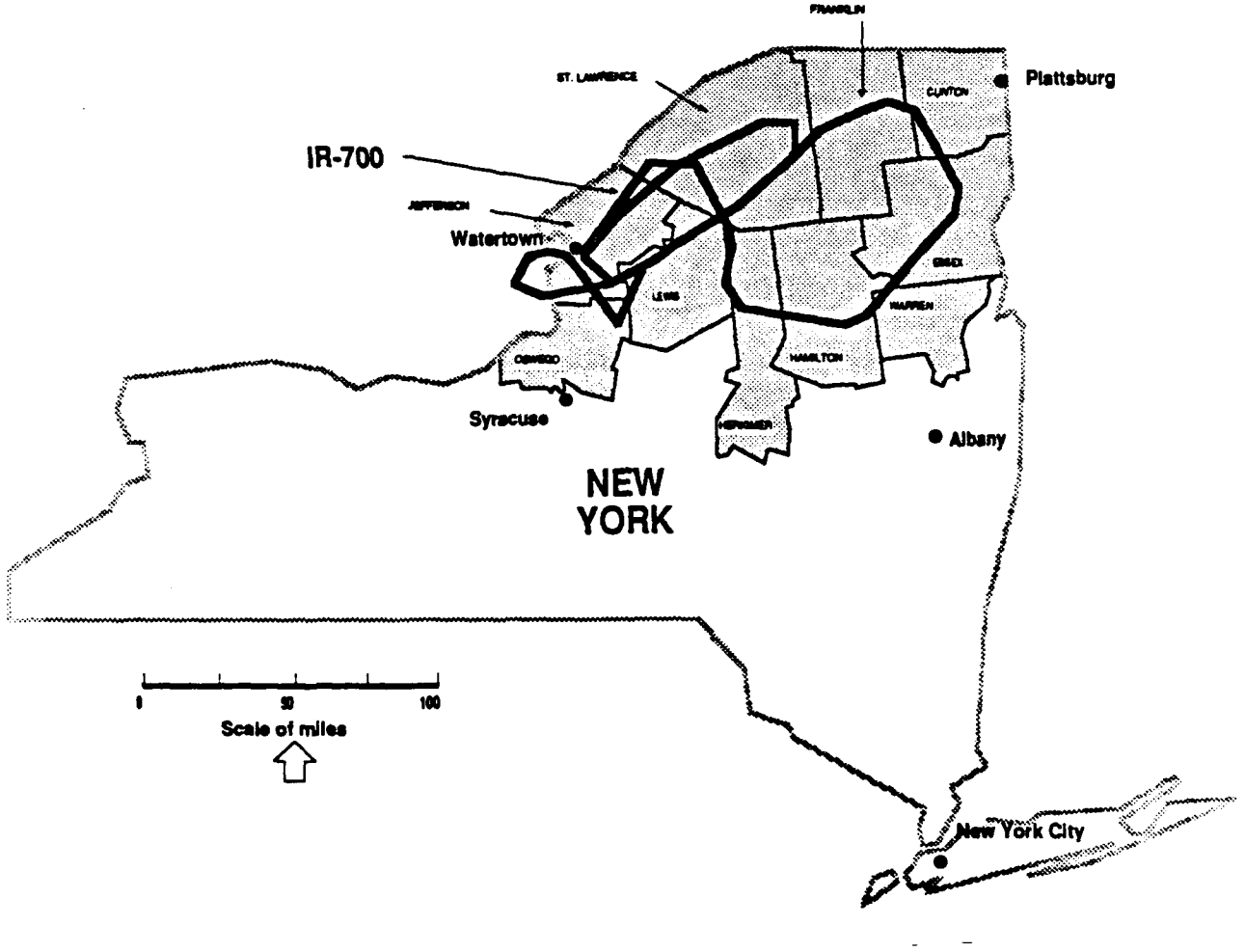


Fig. A.1.1. Map of IR-700

Average type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
FB-111	13.1	400-500	480
B-52G	4.6	400-500	370
B-52H	2.5	400-500	370
Total	20.2		

Five MTRs and five MOAs are concurrent with IR-700. The busiest of these are sections 1 and 2 of the Syracuse MOA, controlled by the Air National Guard's 174th Tactical Fighter Wing, each having the following scheduled monthly usage in 1986:

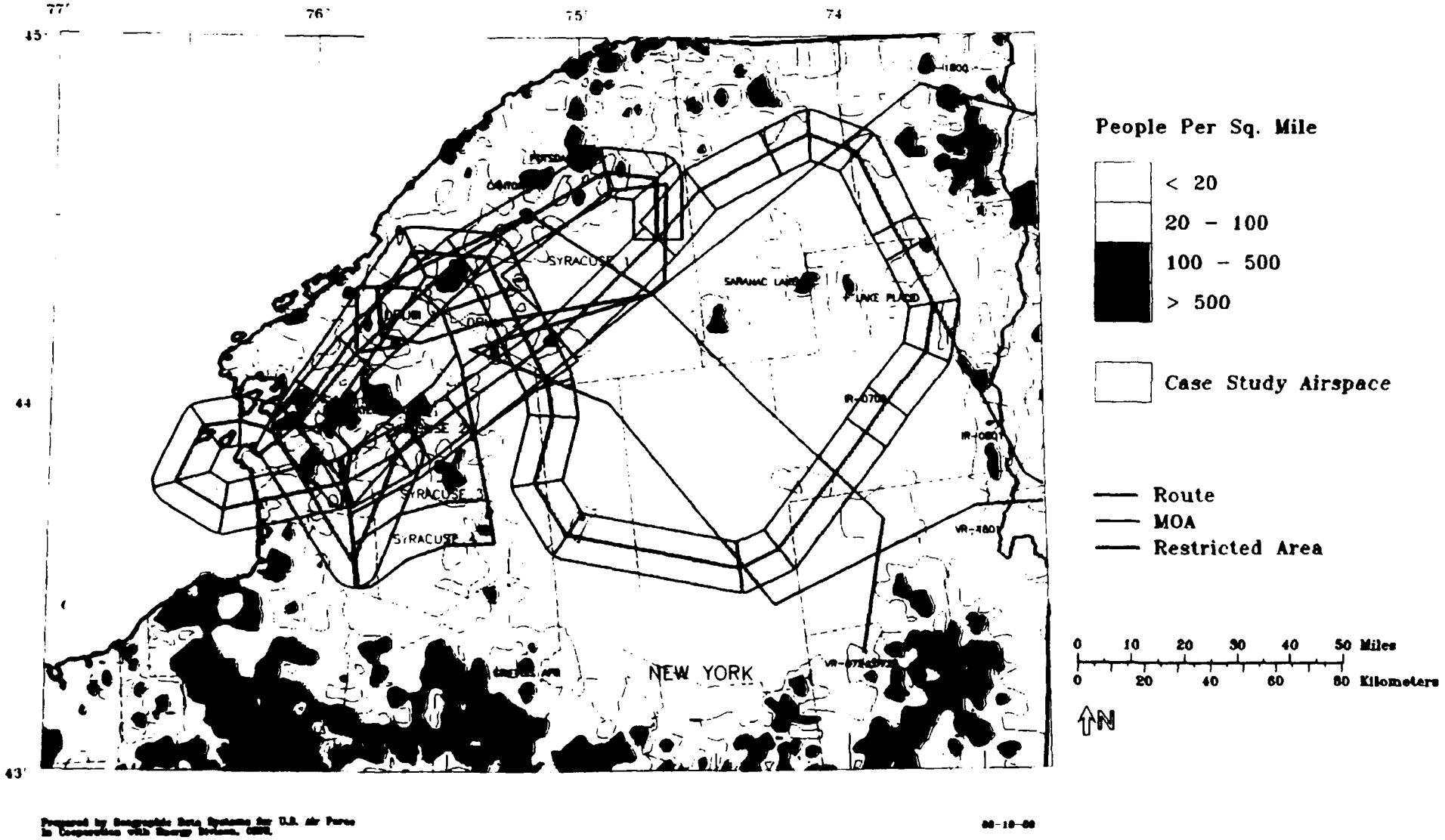
Average type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
A-10	300	300-500	340
F-16	300	500	520
Total	600		

A.2 SOCIAL

A.2.1 Resource Description

Approximately 20,400 people lived beneath the low altitude segments of IR-700 in 1980; the average population density beneath these segments was approximately 9.4 persons/sq. miles. In comparison, the population density of New York was 370.6 people/sq. miles in 1980 and the U.S. density was 64.0 people/sq. miles. Figure A.2.2 shows population distribution under IR-700.

Fig. A.2.2 Population distribution in the IR-700 region.



A.2.2 Impact Assessment[1]

Overall, the impacts of low altitude flights to people living or working under IR-700 are moderate.[2] More specifically, moderate levels of annoyance and activity disruption, low altitudes of social disruption, and negligible[3] disturbances to livestock productivity and young people in group facilities were reported.

A.2.2.1 *Awareness*

Since awareness is a precondition of annoyance and disruption, it is important to examine this factor to assess the potential impacts of Air Force low altitude flying operations. Of the 87 respondents[4] surveyed beneath IR-700, 85 (97.7%) were aware of low altitude military flights in the vicinity. Telephone interviews with 55 local government officials and newspaper editors representing communities beneath IR-700 revealed that 43 (78%) were aware of flights in the area.

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[1]For each case study, the impact assessment summarizes the results of several GEIS surveys that sought to identify the nature and extent of impacts to people living under the airspace. Survey results also reflect the responses of many residents to other, concurrent low altitude airspaces. For definitions of the various levels of social impacts, see Sect. 4.1.2.

[2]Overall assessments of impacts in the GEIS are based on the highest level of impact in any one category (annoyance, interrupted activities, social disruption, disruption of young in group facilities, and disruptions to livestock productivity).

[3]The category of negligible impacts includes no reported impacts.

[4]In this Addendum, the term "respondents" refers to interview responses per interview location. Sampling units were structures, and more than one individual could be interviewed at a single structure. For scaled questions, all responses from a structure were averaged to make a single response. For open-ended questions, all different responses were used in analysis; duplicate responses were counted only once.

A.2.2.2 *Annoyance*

Thirty-five respondents (40.2%) were highly annoyed with at least one aspect of the flights—a moderate impact. Twenty-seven (31%) were highly annoyed by aircraft noise, 18 (20.9%) by the altitude of the flights and by the possibility of an aircraft accident, and 12 (14.1%) by the presence of the flights.

Conversely, 30 respondents (34.5%) reported low annoyance[5] with the flights on all four annoyance variables. Sixty-five (76.5%) reported low annoyance with the presence of the flights, 52 (60.5%) with the possibility of an aircraft accident, 50 (58.1%) with the altitude, and 39 (44.8%) with the aircraft noise.

A.2.2.3 *Interrupted activities*

Twenty-one respondents (24.1%) beneath IR-700 reported sleep interruption or interruption of three or more non-sleep activities[6] during the previous month (a moderate impact). Twelve respondents (14.1%) reported sleep disruption. Four respondents (4.6%) reported the interruption of three non-sleep activities. Four also reported the interruption of four of these activities, and eight (9.2%) reported the interruption of five non-sleep activities. None reported the interruption of more than five non-sleep activities. On the other end of the scale, 46 respondents (52.9%) reported no interruption of non-sleep activities, 18 (20.7%) reported the disruption of one non-sleep activity, and seven (8%) reported the interruption of two such activities.

[5]The category "low annoyance" includes no annoyance.

[6]Survey questions asked about disruption of the following non-sleep activities: personal conversations; telephone conversations; watching television or listening to the radio; reading or concentrating; work activities; and childrens' activities.

A.2.2.4 *Community disruption*

Two (3.6%) of the local officials and newspaper editors were aware of community disruption resulting from the low altitude flights, indicating a low impact level.

A.2.2.5 *Disturbance of young in group facilities*

Neither the local officials nor the newspaper editors contacted had received complaints regarding the disturbance of the very young in group facilities beneath IR-700. This indicates a negligible impact. In addition, reports of aircraft disturbing children were made at five interview locations.

A.2.2.6 *Reduced livestock productivity*

None of the local officials and newspaper editors was aware of reported losses in productivity from commercial livestock operations beneath IR-700. Impacts in this area apparently are negligible. Disturbance of domestic animals was reported in five face-to-face interviews.

A.2.2.7 *Impact indicators*

One respondent (1.2%) previously had complained formally about the low altitude flights. Twenty-six respondents (31.7%) reported informal complaints to friends or family. Six of these had complained more than once a month, 13 had complained between once a month and three times a year, and seven had complained three times a year or less. In addition, 34.5% of the local officials and newspaper editors had received complaints about the flights.

Overall, 17 respondents (20.5%) beneath IR-700 either were opposed or strongly opposed to the flights. Thirty-four (41%) neither opposed nor supported the flights, and 31 (37.3%) either supported or strongly supported these activities.

A.3 NOISE

A.3.1 Resource Description

Any human health effects that may exist are thought to be dependent upon noise induced stress from the aircraft. The noise metric of interest for determining health impacts is the day-night adjusted average noise level, L_{dnmr}.

Using ROUTEMAP, the L_{dnmr} for IR-700 is 52.1 dB at centerline and 50 dB at 3 miles from centerline (see Fig. A.3.1). In other words, the noise level is not much greater than the ambient L_{dn} level (50 dB). Beneath the area where IR-700 crosses the Syracuse MOA, the L_{dnmr} is 58.1 dB at centerline of IR-700 and 57.2 dB 3 miles from centerline.

The maximum SEL for IR-700 is 122.2 dB at centerline and 80.2 dB 3 miles from centerline. Beneath the area where IR-700 crosses the Syracuse MOA, the maximum SEL is also 122.2 dB at centerline and 80.2 dB 3 miles from centerline.

A.3.2 Impact Assessment

IR-700 is scheduled for an average of one bomber sortie per day. Where only the bomber sorties take place, the noise level is rather low with an L_{dnmr} of 52 dB. The addition of activity in concurrent use areas increases the noise level to 58 dB. Based on

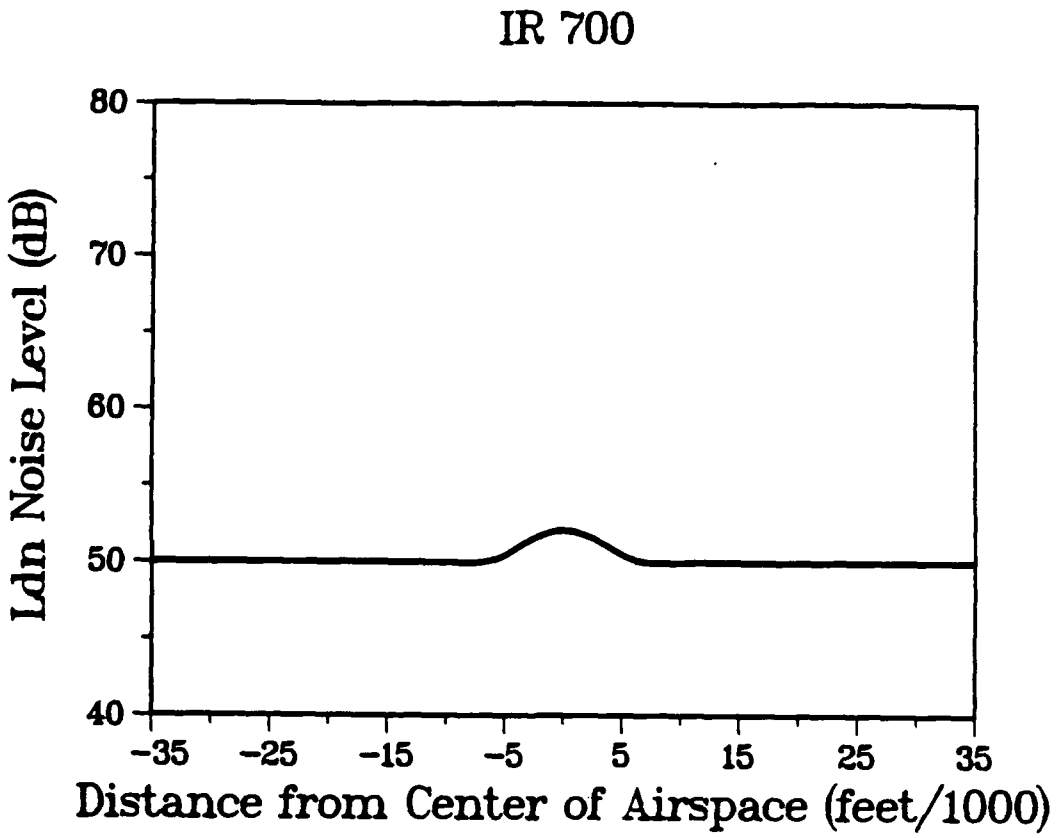


Fig. A.3.1. L_{dnmr} levels for IR-700.

the traditional annoyance versus L_{dnmr} relationship, about 2 to 3% of the people overflown in the IR route will be highly annoyed; approximately 3 to 9% of the population under the busiest concurrent use area will be highly annoyed. No community actions would be anticipated. The noise level is below that required to be suspect in adding a stress risk factor in any cardiovascular related disease. The health impact designation for both the route only and the concurrent airspace is negligible.

A.4 AMERICAN INDIANS

The closest American Indian reservation is the St. Regis Mohawk Indian Reservation located 15 miles south of the U.S.-Canadian boundary and approximately 10 miles north of IR-700. Figure A.4.1 portrays this reservation and other federally protected areas.

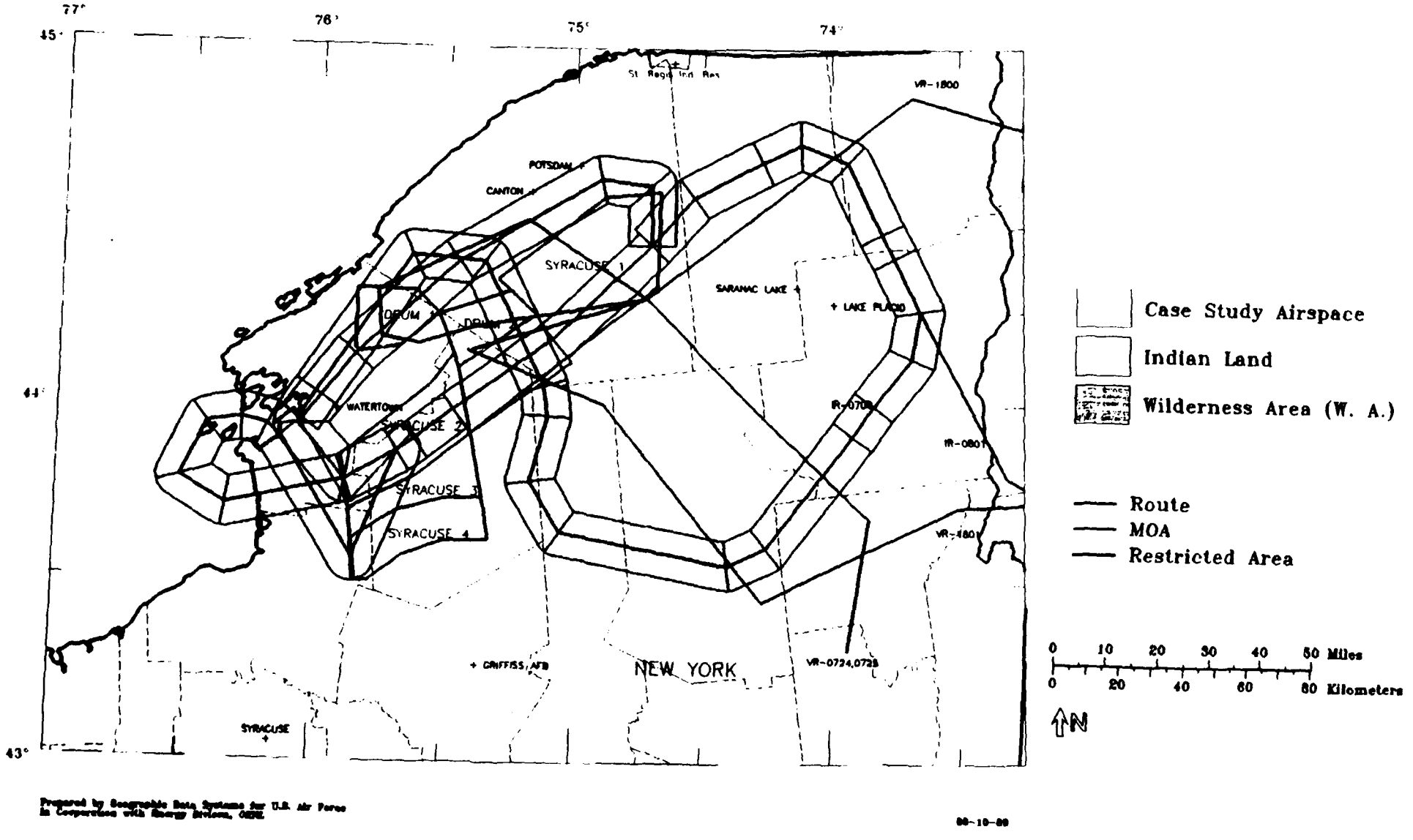
Telephone contacts with officials indicated no issue with low altitude overflights; therefore, no impact assessment was made.

A.5 STRUCTURES

A.5.1 Resource Description

Typical structures under IR-700 include one- and two-story brick buildings; one- and two-story frame buildings; mobile homes; and stone and frame barns. Much of the building stock is older because of the relative longevity of settlement in upstate New York. Since the route is located over the Adirondacks, cottages and cabins suitable for summer use are numerous in the area.

Fig. A.4.1 Federally protected areas in the IR-700 region.



Prepared by Geographic Data Systems for U.S. Air Force
In Cooperation with Energy Systems, ORNL

88-10-88

A.5.2 Impact Assessment

IR-700 is designed for FB-111 bombers and heavy bombers. While large numbers of the latter aircraft have the potential for producing damage, the number of sorties is so low that it will be difficult if not impossible to detect any adverse impacts, which will be much less than normal aging effects. Based on GEIS findings (Appendix E), it is unlikely that any noticeable damage to typical structures in the area, including cracked walls or foundations or broken windows, could be expected to result from the Air Force's current low altitude flying operations.

A.6 WILDERNESS AND PARKS

A.6.1 Resource Description

No federal national parks or wilderness areas are under IR-700. Adirondack State Park (Fig. A.4.1) and the state's designated wilderness areas within it are, however, beneath the route and deserve special attention because of their size and importance among conservationists in the East. Consisting of 6 million acres, this park includes parts of Clinton, Essex, Franklin, Hamilton, Herkimer, Lewis, St. Lawrence, Warren and Oneida Counties. Of these 6 million acres, 2.4 million acres is under direct state jurisdiction; the remaining 3.6 million acres is in private possession among the residents of small communities within the park. Of the 2.4 million state-owned acres, 1 million acres is designated strictly as wilderness areas under the State Wilderness Act. Another 1.2 million acres is designated as Wild Forest and falls partly under the jurisdiction of both the state and private communities. It is accessible by road, but no development is permitted. The remaining areas are green and open spaces. Activities in Adirondack State Park include hiking, climbing, cross-country skiing, and boating.

A.6.2 Impact Assessment

The major sensitive area examined in this case study is the Adirondack State Park. Representatives of groups and agencies associated with use of this park and wilderness were interviewed in order to assess the impacts of IR-700. Individuals consulted were officials of the Adirondack Mountain Club, the Adirondack Council, and the Adirondack Park Agency.

No positive impacts were suggested in the course of these interviews. Negative impacts that were raised include the disruption of solitude and the aesthetic experience of individuals using the area. Since other recreational areas in the region do not provide this aesthetic experience, people seek out and enjoy the experience in the Adirondack Park. The uniqueness of this aesthetic experience applies regardless of whether or not the enjoyment centers around hiking, camping, or boating and whether or not these different recreational experiences may clash with one another. Adirondack State Park officials raised the issue of the basic philosophical contradiction of the presence of low altitude military aircraft in wilderness areas.

The character of New York state's wilderness areas are, by law, protected similarly to federal wilderness areas. Adirondack state park officials reported the intrusion of low altitude military aircraft on wilderness character to be a disruption of a user's sense of removal from the influences of industrial society, but did not report incidents of extreme intrusiveness. They maintain, however, that the area of pristine wilderness quality is extremely small, and thus vulnerable to violation. Literature review data suggest that users desire solitude, but are more tolerant of violations to this solitude if they expect that the likelihood of such violation is high. Threats to enjoyment of wildlife and safety were not cited. Lack of consultation between Air Force officials and caretakers in

planning an associated airspace has resulted in recent increased levels of concern about interference with the wilderness character of the area.

A.7 WILDLIFE

A.7.1 Resource Description

Wildlife habitat in the IR-700 region of New York comprises primarily maple-beech-birch forest, with scattered areas at high elevation dominated by spruce-fir forest, white-red jackpine forest, and aspen birch forest (Eyre 1980). Elm-ash-cottonwood forest is prevalent in northwest New York in the St. Lawrence Valley. Numerous lakes are located in the Adirondacks.

Important wildlife species in the region include the white-tailed deer, common loon, bald eagle, several other species of raptors, and many species of ducks and geese. White-tailed deer are common throughout the area and during the winter concentrate in some areas located beneath IR-700 (Browne 1987). The common loon, whose populations have greatly declined since the turn of the century and are still subject to a number of threats (McIntyre 1986), nests throughout the Adirondacks (Browne 1987).

During spring and fall migration, raptors, ducks, geese, shorebirds, and gulls often funnel around the eastern end of Lake Ontario and are thus concentrated in this area, principally in March through April and September through October (Browne 1987; Wich 1987).

Little Galloo Island on Lake Ontario and the Perch River Wildlife Management Area north of Watertown, both of which are located under IR-700, are important avian nesting areas for birds. The 40-acre Little Galloo Island may support more than 100,000

pairs of 7 bird species. It supports the largest colony of double-crested cormorants in the Great Lakes Basin (about 2000 nests in 1986), and its ring-billed gull colony may also be the largest of this species in the basin (Browne 1987). The Perch River Wildlife Management Area supports many nesting ducks and geese and has one of three currently active bald eagle nests in New York.

Federally listed endangered (E) and threatened (T) animals for counties lying under the route include the eastern cougar (E), the American and arctic peregrine falcons (E), and the bald eagle (E). Of these, only the bald eagle is known to be present.

A.7.2 Impact Assessment

The 590 mile long IR-700 passes over many important wildlife resource areas in the portion of New York state to the east and to the northeast of southeastern Lake Ontario. Only portions of IR-700 totaling approximately 250 miles in length are used for low altitude flight. In these portions the potential for impacts on wildlife is probably greater than in areas where flying is at higher altitudes.

Important wildlife resources that could be affected by IR-700 include a pair of nesting bald eagles and nesting ducks and geese at the Perch River Wildlife Management Area, a large mixed colony of thousands of nesting birds on Little Galloo Island, hacking sites for peregrine falcons, nesting common loons found throughout the Adirondacks, winter concentrations of white-tailed deer, and wildlife in areas that have been designated by the State of New York as significant fish and wildlife habitats. The New York State Department of Environmental Conservation suggested that low altitude flying operations might reduce the reproductive success of nesting birds and the survival of winter-stressed deer in these areas (Browne 1987; Wich 1987). Because the route crosses

important wildlife resources in New York and state officials have expressed concern, impacts are classified as low for endangered species and moderate for other wildlife.

A.8 LIVESTOCK AND POULTRY

A.8.1 Resource Description

The 1988 report of New York Agricultural Statistics showed that St. Lawrence and Jefferson counties, which underlie portions of IR-700, were the state's top two counties in dairy products and cattle/calves (Table A.8.1) (NYDAM 1988). These two commodities comprised 90% of the total cash receipts for all livestock and poultry commodities and nearly 64% of all plant and animal commodities. IR-700 traverses St. Lawrence County and Jefferson County, where minimum authorized flight altitude for aircraft is sometimes less than 100 ft AGL (although aircraft generally fly at 400 ft AGL or higher). Leading counties for other commodities were not reported in the state's agricultural summary. Although mink represent relatively little value compared to other animal commodities in New York, the state ranked 13th and 12th in 1986 and 1987, respectively, in production of mink pelts (USDA 1988).

A.8.2 Impact Assessment

IR-700 traverses a total of 293 miles in St. Lawrence and Jefferson counties. Thus, there is relatively large potential for conflicts of low altitude aircraft with livestock resources under IR-700. However, significant impacts have not been reported to the New York Department of Agriculture and Markets (Butcher 1987). Similarly, the survey of local officials discussed in Sect. 4.1.2.5 reported no complaints about losses. Other animal commodities (eggs, hogs, ducks, etc.) rank much lower in importance (Table A.8.1). Impacts are classified as low for both poultry and for livestock.

Table A.8.1. Livestock and poultry rankings for IR-700 in New York: National and state rankings and leading counties

Commodity	Rank N	Rank S(%)	Leading counties
Dairy products	3	5.8	St. Lawrence, Jefferson, Wyoming, Madison, Otsego, Lewis, Delaware, Washington
Cattle and calves	32	5.8	St. Lawrence, Jefferson, Wyoming, Madison, Delaware, Chautauqua, Otsego
Eggs	20	3.0	NR
Hogs	32	0.6	NR
Ducks	NR	0.5	NR
Chickens, excluding broilers	13	0.1	NR
Turkeys	NR	0.1	NR
Sheep	29	0.1	NR
Broilers	NR	0.1	NR
Other	--	3.6	--
Total	--	71	--

Explanation: National rank (N) is State's place among all U.S. states; State rank (S) is the percentage of the cash receipts for all plant and animal agricultural commodities in New York in 1986; NR = not reported; Leading counties are listed in order from highest to lower value of livestock; Underlined counties underlie the low altitude flight route; Data for mink and honey were also reported but did not include rank or leading counties.

Source: NYDAM (1988).

A.9 AIR QUALITY

A.9.1 Resource Description

There are no designated NAAQS non-attainment areas in counties overflown by IR-700 (EPA 1989) and there are no PSD Class I areas under or within 6 miles of IR-700.

A.9.2 Impact Assessment

The air quality impact analysis for IR-700 indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be well below levels of concern for the area. The maximum predicted incremental concentrations for IR-700 were less than 5% of the NAAQS and PSD Class II increments applicable in the areas underneath this route. Thus, the air quality impacts of IR-700 and concurrent route segments are considered to be negligible (Table 4.1.9).

B. IR-474 (WYOMING, MONTANA)

B.1 AIRSPACE

IFR Route 474 (IR-474) is part of SAC's Strategic Training Range Complex (STRC) in the northwestern United States (Fig. B.1.1). The MTR, established on December 21, 1981, is scheduled from Offutt AFB, Nebraska. IR-474 lies in the Great Plains region and begins over northwestern Nebraska, crosses the northeastern portion of Wyoming, and then proceeds northward over Montana, where it loops before reaching its end near the Canadian border. The low altitude segments of the route pass over 8 counties in Wyoming and 16 in Montana.

The terrain beneath IR-474 is vast expanses of open, rolling grasslands with small peaks and buttes interspersed throughout, with high hills and mountains in the Bighorn range in northern Wyoming and around the Custer National Forest in southern Montana. The land uses beneath IR-474 are primarily ranching or oil drilling operations. Visibility is generally very good across these open spaces.

IR-474 was established to provide training for SAC aircrews at low altitudes, between the earth's surface and 20,000 ft MSL. The route varies in width from 8 to 9.2 statute miles along a distance of 926.1 miles, covering an area of 8,347 sq. miles IR-474 can be scheduled 24 hrs/day, 7 days/week.

In 1986 the following average number of aircraft sorties were scheduled per month on IR-474.

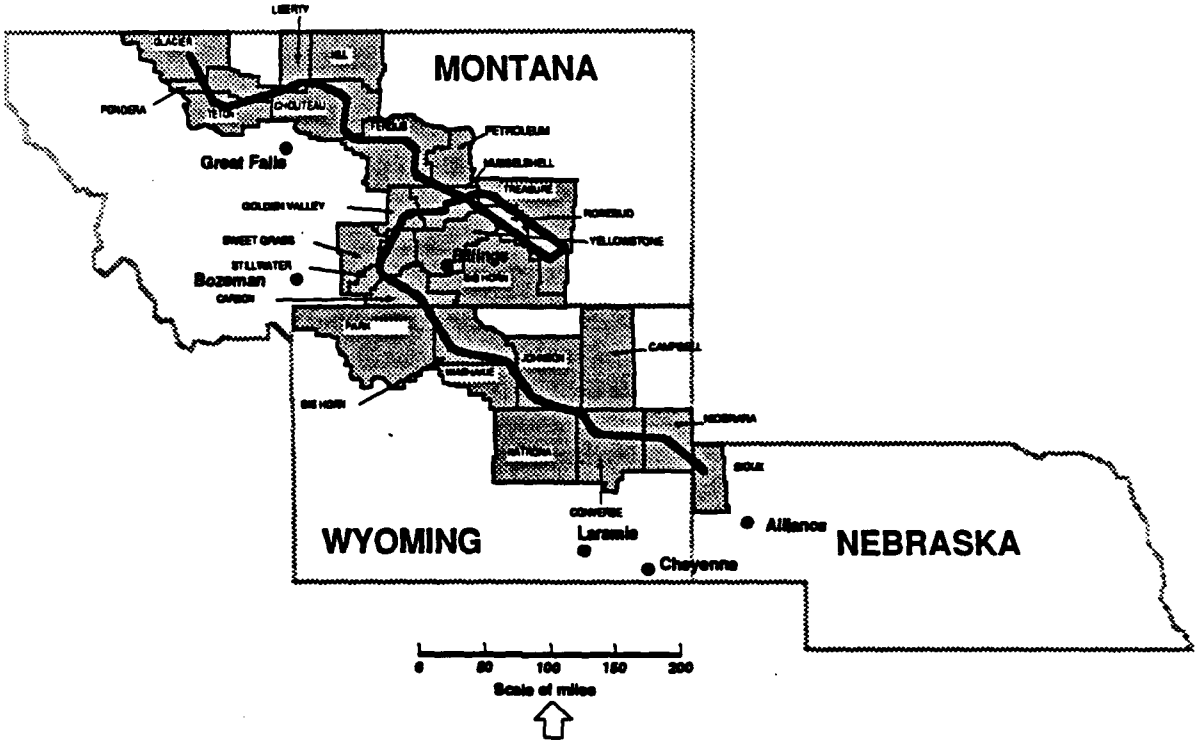


Fig. B.1.1. Map of IR-474.

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
B-52G	37.0	400	390
B-52H	19.1	400	390
B-1B	6.6	400	630
FB-111	3.3	400	520
Total	66.0		

Although IR-474 is still available for Air Force use at all times, it is not currently used for training purposes. However, there are at least 15 concurrent routes, some with little variation from IR-474. SAC aircraft fly 85% of their sorties within 2 miles of these routes' centerlines, and 94% of their sorties within 4 miles of centerline. The busiest of these is IR-473 with the following average number of aircraft sorties scheduled monthly in 1986:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
B-52G	99.30	400	390
B-52H	51.15	400	390
B-1B	17.70	400	630
FB-111	8.85	400	520
Total	177.00		

B.2 SOCIAL

B.2.1 Resource Description

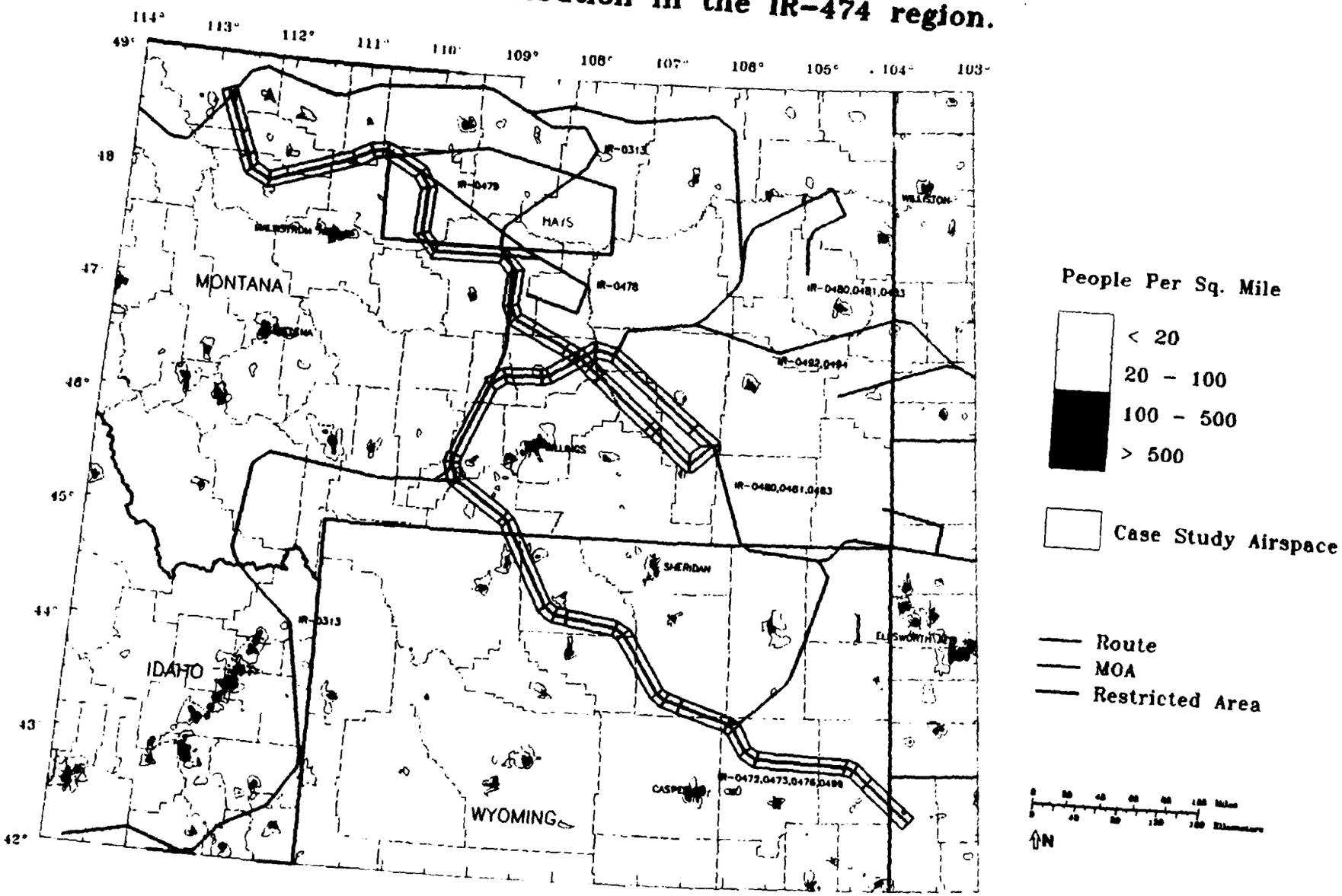
Approximately 14,800 people lived beneath the low altitude segments of IR-474 in 1980; the average population density beneath these segments was approximately 1.8 persons/sq. miles. In comparison, the population densities of Montana and Wyoming were 5.4 and 4.8 people/sq. miles respectively, in 1980 and the U.S. population density was 64.0 people/sq. miles. Figure B.2.2 shows population distribution under IR-474.

There are 11 small towns beneath the low altitude segments of IR-474 in Wyoming, the largest being Basin (population 1,349) and Byron (633). There are also 20 small towns beneath the low altitude segments of IR-474 in Montana. The most heavily populated of these Montana towns are Absarokee (750) and Geraldine (305).

B.2.2 Impact Assessment

Thirty-nine face-to-face interviews were conducted under the long and sparsely populated IR-474. From these interviews and key informant interviews, it appears that the overall impacts of military low altitude training activities is moderate. Moderate levels of impact were reported for the categories of annoyance, activity disruption, and disturbance of livestock and productivity. The impacts of heights on social disruption were low, while impacts on the young in group facilities were negligible.

Fig. B.2.2 Population distribution in the IR-474 region.



B.2.2.1 *Awareness*

All 39 (100%) of the respondents surveyed beneath IR-474 were aware of low altitude military flights in the vicinity. Forty-six (92%) of the 50 local government officials and newspaper editors contacted were aware of flights in the area.

B.2.2.2 *Annoyance*

The impact of flights on annoyance was moderate, as 10 respondents (26.3%) were highly annoyed with at least one aspect of the flights. Six (16.2%) were highly annoyed by aircraft noise, 5 (13.2%) by the possibility of an aircraft accident, and 4 (10.5%) by the presence and the altitude of the flights.

At the other end of the scale, 18 respondents (47.4%) reported low annoyance with the low altitude flights on all four annoyance variables. Twenty-eight (73.7%) reported low annoyance with the presence and the altitude of the flights, 25 (65.8%) with the possibility of an aircraft accident, and 23 (62.2%) with the aircraft noise.

B.2.2.3 *Interrupted activities*

Eight respondents (21.1%) reported Sleep interruption or interruption of three or more non-sleep activities during the previous month were reported by eight respondents (21.1%). This constitutes a moderate impacts. Five respondents (13.9%) reported sleep disruption. Three respondents (7.9%) reported the interruption of three and four non-sleep activities. No one reported the interruption of more than four non-sleep activities. Twenty respondents (52.6%) reported no interruption of non-sleep activities, 6 (15.8%) reported the interruption of one non-sleep activity, and 6 reported the interruption of two such activities.

B.2.2.4 *Community disruption*

One (2%) of the local officials and newspaper editors interviewed as representatives of the area beneath IR-474 was aware of community disruption resulting from the low altitude flights. This indicates a low impact level.

B.2.2.5 *Disturbance of young in group facilities*

None of the key informants had received complaints regarding the disturbance of the very young in group facilities beneath IR-474, indicating a negligible impact. None of the people interviewed face-to-face reported that aircraft bother their children.

B.2.2.6 *Reduced livestock productivity*

Ten (20%) of the local officials and newspaper editors were aware of reported losses in productivity from commercial livestock operations beneath IR-474. This represents a moderate impact. In addition, 4 field interviewees reported that their livestock were disrupted by the flights.

B.2.2.7 *Impact indicators*

One respondent (2.7%) previously had made one or two formal complaints about the low altitude flights. Eight respondents (21.6%) reported informal complaints to friends or family. One of these had complained more than once a month, 3 had complained between once a month and three times a year, and 4 had complained three times a year or less. Also, 36% of the key informants had received complaints about the flights.

Overall, four respondents (10.8%) beneath IR-474 either were opposed or strongly opposed to the flights. Nine (24.3%) neither opposed nor supported the flights, and 24 (64.9%) either supported or strongly supported these activities.

B.3 NOISE

B.3.1 Resource Description

The human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP the L_{dnmr} for IR-474 in 1986 was 59.5 dB at centerline and 50 dB at 3 miles from centerline (Fig. B.3.1). Beneath the area where IR-474 and IR-473 are concurrent, the L_{dnmr} was 63 dB at centerline and 53.1 dB 3 miles from centerline.

The maximum SEL for IR-474 is 123.5 dB at centerline and 80.9 dB 3 miles from centerline. Beneath the area where IR-474 and IR-473 are concurrent, the maximum SEL is also 123.5 dB at centerline and 80.9 dB 3 miles from centerline.

B.3.2 Impact Assessment

The fact that IR-474 is currently not used for training argues against any health impacts. However, with at least 15 concurrent routes, the same airspace is utilized. Both IR-474 and the concurrent routes are flown principally by bombers. Noise levels of 59 L_{dnmr} and 63 L_{dnmr} are projected for the route and the busiest concurrent use areas respectively. These levels are expected to result in 3 to 9% and 9 to 15% of the affected population as being highly annoyed on the basis of the traditional L_{dnmr} versus annoyance relationship. Some areas of the busiest concurrent use locations may

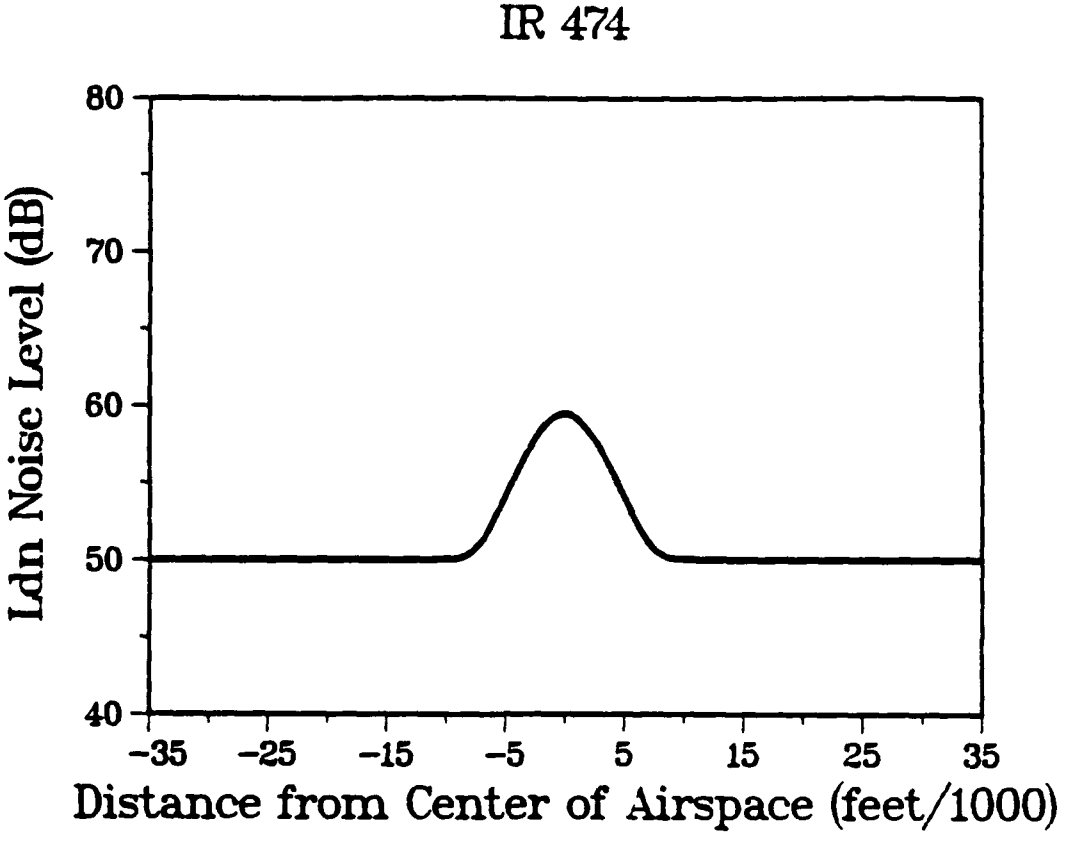


Fig. B.3.1. L_{dnmr} levels for IR-474.

experience sporadic complaints. All of the areas under IR-474 are judged to experience negligible health impact on the basis of considerations of the noise level versus hypertension risk. The noise levels are simply too low to be suspected as adding a stress risk factor in any cardiovascular disease.

B.4 AMERICAN INDIANS

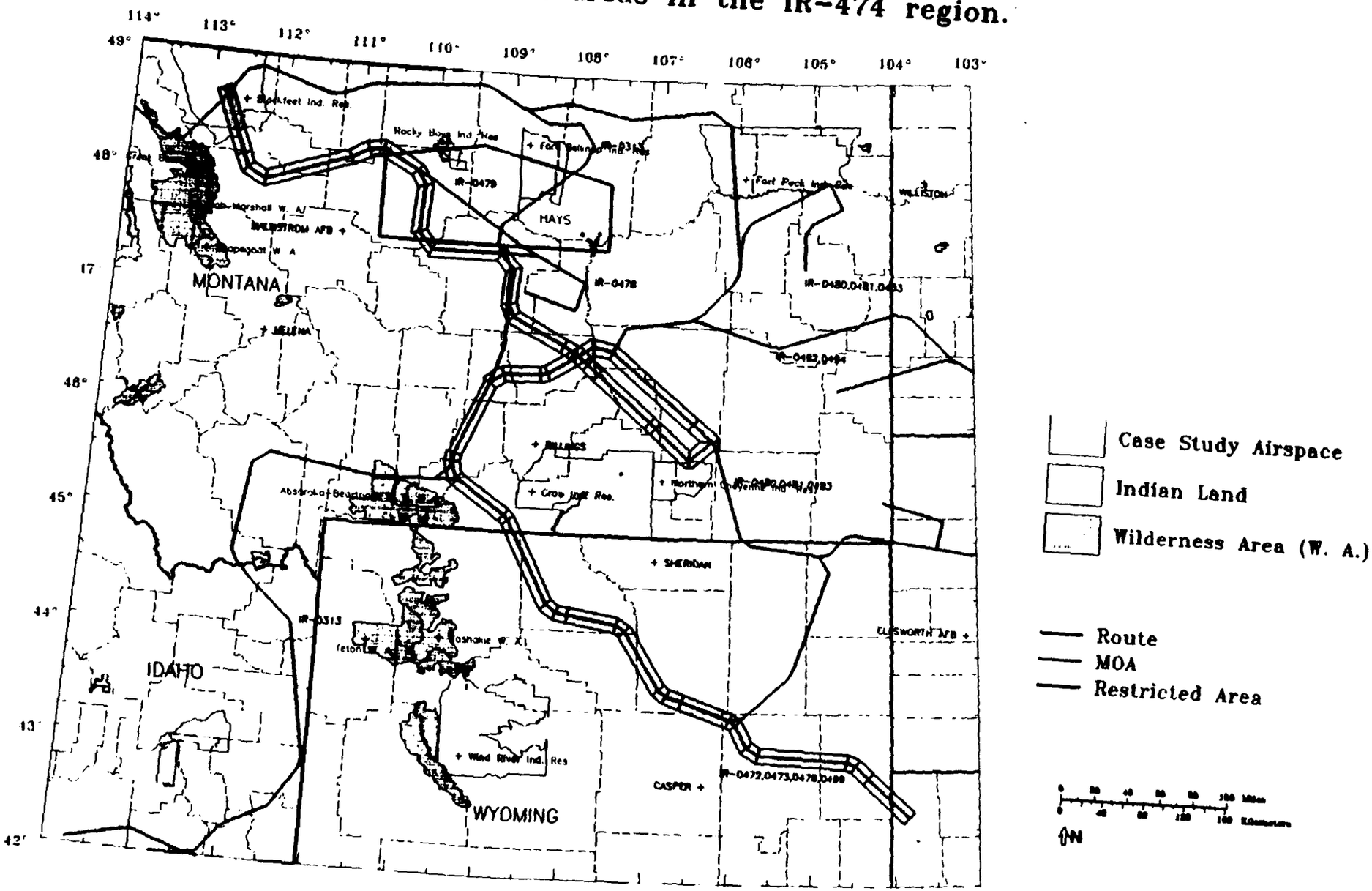
B.4.1 Resource Description

The Blackfeet and Northern Cheyenne Reservations are the principal Indian lands under IR-474 (Fig. B.4.1). Also located near IR-474 in Montana but under other Air Force low altitude airspace is the Crow Reservation. People from these tribes are descendants of the Northern Plains Indian Tribes, and these reservations generally include land to which the original inhabitants were either forcibly relocated or restricted following the climactic Indian Wars of the 1870s. Unemployment is high, and there is considerable pressure for the development of a tribal economy which will enhance tribal economic self sufficiency and mitigate the present high dependency on non-Indian society.

The Blackfeet Indian Reservation (pop. 7193) is located in Glacier and Pondera counties of Montana and forms the eastern border of Glacier National Park. The total area of the reservation, including allotted land, government and non-Indian land, is 906,441 acres.

Current residents of the reservation are descendants of three related Algonquian-speaking groups, the Piegan, the Siksika or Northern Blackfeet, and the Blood. Among the first Algonquian tribes to move from the eastern woodlands to the prairies, they hunted buffalo and held a vast territory that ran from northern Saskatchewan to the

Fig. B.4.1 Federally protected areas in the IR-474 region.



southernmost headwaters of the Missouri River. Following the destruction of the buffalo herds in the 1880s, the Blackfeet were gathered into the present reservation by 1888. Present tribal income comes from mineral development, as well as farming and ranching.

The Northern Cheyenne number approximately 3,200, and residents make their living primarily through ranching and public sector tribal and federal government/service employment. The 433,594 acre reservation is located approximately 100 miles east of Billings. Access to the reservation is from State Highways 212 and 39. With a population of approximately 5,900, the Crow Indians make their living primarily through ranching and public sector tribal and federal government/service employment. They are located approximately 60 miles east of Billings. Access to the reservation is from Interstate 90, about 30 miles east of Billings.

B.4.2 Impact Assessment

Potential impacts to Indian tribes under IR-474 were identified through meetings with representatives of the Northern Cheyenne and the Blackfeet, whose reservations are under the route; the Crow, whose reservation is near IR-474 as well as under several other low altitude airspaces; and Native Action, an Indian advocacy group for Montana tribes.

B.4.2.1 *Positive impacts*

Speakers also observed the positive example which these flights provide for the young people, who may be encouraged to enlist in the military and pursue mathematics, science, and other subjects valuable for the young people and the tribe.

B.4.2.2 *Sovereignty*

Tribal governmental legitimacy and credibility were a concern of the Cheyenne and the Crow. Although not under IR-474 themselves, the Crow have become increasingly exasperated by what they view as the unilateral use of their resources by private corporations and governmental entities. In the context of this violation, they have responded to allegedly similar activities by the military by declaring exclusive sovereignty over their airspace. They also have drafted tribal legislation intended to protect air and water quality.

B.4.2.3 *Religion*

Interference with religion appears to be the most serious issue regarding low altitude flying. Interference occurs in two forms: (1) damage to the natural relationship between the people and the environment, particularly the spiritual harmony of certain places and (2) interruption of vision quests.

The Northern Cheyenne, like the Crow and the Blackfeet, believe that animals, plants and landforms have spiritual qualities and that people develop special relationships with the spirits that inhabit their locality. The Cheyenne are most concerned about the effects on these relationships in two areas, Birney and the Black Hills.

Birney is a small village in the extreme southeastern corner of the reservation, and is its most traditional community. The maintenance of its uninterrupted spirituality is important to all Northern Cheyenne who go there to renew themselves in a spiritual sense. Birney was long the home of the Medicine Hat (Sacred Buffalo Hat) which is a holy covenant central to Northern Cheyenne religion. Though the Sacred Buffalo Hat has been moved, the preservation of the spirituality of the Buffalo Hat is still tied to

the preservation of the spirituality of Birney. The noise of the flights is disturbing the spiritual harmony of the area and, by interrupting the peace and solitude, makes it difficult to teach the children respect for the spirituality of the area. Thus, both current practice and the transmission of the Northern Cheyenne religion is threatened by the presence of low altitude flights.

Similar concerns were expressed about the Black Hills. While the Black Hills are not located under IR-474, the Cheyenne made clear the need to protect the area from disturbance. This need is especially crucial for Bear Butte where the Northern Cheyenne received their other covenant, the Sacred Arrows. Pilgrimages to the Black Hills are a regular part of Northern Cheyenne religion. Important quiet times when the mountain spirits should not be disturbed are just before sun up and just before sun down, when the mountain spirits are saying their prayers.

These two sites, along with the Badger-Two Medicine area, Medicine Deer Rock, and the Sweet Grass Hills, are important sites of vision quests for the Blackfeet, Northern Cheyenne and the Crow. A vision quest is a direct petition to the supernatural that allows one to redefine his meaning in life and recapitulate his position in the universe. The ceremony requires that the person be isolated from the community in as pristine an area as possible. The quest must occur in an area undisturbed by people, man-made noise, and visual intrusions.

Vision quests are affected by low altitude flights in two ways. One, as explained above, is the viability of the site. There are increasingly fewer places where vision quests can occur without the intrusion of man-made noise. Air Force low altitude aircraft now fly over Badger-Two Medicine area and the Birney area, two of these remaining sites. Secondly, if a vision quest is interrupted by man-made noise, such as a low flying aircraft, it loses its effectiveness. Though it might be redone in another season, this

possibility is not guaranteed because of the enormous amount of energy and time a vision quest may expend.

Disruption and frightening of wildlife, particularly the nesting of waterfowl and birds on the Tongue River, caused by low altitude aircraft is problematic in a religious sense also. Traditional belief holds that disruptions of this sort upsets the spiritual harmony of the area.

B.4.2.4 *Economy and subsistence*

No adverse impacts to tribal economic development or subsistence activities were identified.

B.4.2.5 *Family quality of life*

While non-Indian elderly are affected similarly, stress is increased by lack of knowledge. Some elderly Cheyenne wondered whether or not increases in low altitude flight frequency might be harbingers of warfare. Elderly Crow wondered more generally about the possibility that these planes were symptomatic of a tendency to unduly challenge the natural order of things. The flights also were considered in the context of problems relating to climate change such as damage to the ozone layer.

According to Table 4.4.1, impacts to Indians living under IR-474 are categorized as moderate to high. These include the potential degradation of their governmental legitimacy and serious disruption of the spiritual harmony of particular sites and interference with the Indian's special relationship to sacred sites. The severity of the impact on tribal sovereignty will be affected by ongoing relationships between Indians and non-Indians which involve issues of coal strip mining on the Northern Cheyenne

Reservation and Indian water rights disputes, as well as wider efforts by Montana residents to promote regional conservation and economic self-sufficiency even though these issues are not related directly to Air Force activities.

B.5 STRUCTURES

B.5.1 Resource Description

Typical structures under IR-474 include one and two story brick buildings; one and two story frame buildings; mobile homes; frame barns, outbuildings, and water towers; and prefabricated metal buildings. The building stock is typical of western ranching areas.

B.5.2 Impact Assessment

IR-474 is moderately busy with heavy aircraft and some concurrent use airspaces have an even heavier use factor, again with heavy bombers. For normal buildings, potential effects on structures are considered negligible; and should be well below effects expected from normal aging. However, somewhat greater effects may occur for the more sensitive types of sites (i.e., historic sites and avalanche prone areas). Care should be taken to determine that such sites are not overflown. Based on GEIS findings (Appendix E), it is unlikely that any noticeable damage to typical structures in the area, including cracked walls or foundations or broken windows, could be expected to result from the Air Force's current low altitude flying operations.

B.6 WILDERNESS AND PARKS

B.6.1 Resource Description

Most of Montana's national parks and wilderness areas are located in the central and western part of the state. No national parks or wilderness areas lie beneath IR-474. Several federally protected areas are close to the route, however, and are included in the assessment because of the benefits gained from understanding the regional issues associated with IR-474 (Fig. B.4.1). The closest major wilderness area is the Absaroka-Beartooth Wilderness area, approximately 15 miles from the centerline of IR-474. Also within 20 miles from the centerline of IR-474 are Bighorn Canyon National Recreation Area, Pryor Mountains National Wild Horse Range, Halfbreed Lake Wildlife Refuge and Custer National Forest. To Absaroka's immediate southwest is Yellowstone National Park and to the west is the Lee Metcalf Wilderness area. Other areas are affected by low altitude routes that are concurrent to IR-474. Still other wilderness areas, such as the Selway-Bitterroot, the Bob Marshall and the Frank Church-River of No Return, are mentioned because sources often discussed wilderness areas of Montana in general or did not make it clear which particular area they were associating with a specific event or incident.

Access to the these areas is by highway, boat and private/commercial plane. Commercial planes are a potential issue, particularly in the Frank Church Wilderness, because many small landing strips used for trophy hunting parties already exist, and have been grandfathered into the wilderness areas. Road access, too, is a sensitive issue because of pressures by the National Forest Service to establish roads that will allow more logging.

These wilderness areas are used primarily for hiking, mountain climbing, fishing, hunting and cross-country skiing. Trophy hunting is important commercially, and hunting interests have been very active in the preservation of wilderness areas against logging interests.

B.6.2 Impact Assessment

As noted above no national parks and wilderness areas are under IR-474; consequently, there are no impacts to these resources along the case study route. However, to assess the impacts to these resources in the larger region, a broader assessment was conducted, the results of which follow.

Constituencies interviewed for this broader assessment in Montana and Wyoming included the Montana Wilderness Association, Montana chapters of the Sierra Club, an official of the Selway-Bitterroot Wilderness Area, the Montana Alliance for Progressive Policy, Last Chance Peacemaker's Coalition, Tri-State Concerned Citizens, and the Northern Plains Resource Council and its member groups.

The positive impact of low altitude flying operations mentioned was the potential logistical support for fire fighting during critical summer months.

A number of adverse impacts of low altitude flying were cited by these groups. These include startling and the violation of solitude. In the Absaroka-Beartooth Wilderness Area, the Selway-Bitterroot Wilderness Area and in Glacier National Park, horseback riders cited danger to their safety because the horses were startled by low altitude flights. Hunters said the disruption personally did not bother them but added that the problem could become worse in areas of heavy recreational use. They mentioned particularly the possibility of disrupting wildlife during trophy hunts. Permits, particularly

for out-of-state trophy hunts, are often a once-in-a-lifetime draw. Disruption of such a hunt would be an expensive adverse impact to recreational activity (see also Sect. G.6.2).

Some wilderness users contended that the presence of military aircraft at low altitudes above wilderness lands, such as the Absaroka-Beartooth, Bob Marshall, and Selway-Bitterroot, contradicts the designation of wilderness and its purpose of providing a pristine environment unaffected by man (see Sect. C.6.2). It was feared that such activities could also affect the favorable passage of a Montana wilderness bill, which is already vulnerable to competition from logging interests.

Officials maintained that the present severity of impacts to solitude and the wilderness character from military aircraft use assumes a secondary priority to the frequent use of civilian aircraft and the existence of landing strips in these areas. At the same time, however, the existence of these civilian activities also implies that an increase in Air Force activities could have a cumulative effect on wilderness character. Impacts to wildlife enjoyment, safety and caretaker operations were reported as rare.

B.7 WILDLIFE

B.7.1 Resource Description

The predominant wildlife habitats under IR-474 include grasslands, sagebrush, pine badlands, wheatgrass/sagebrush rangeland, and small-grain agricultural fields. Typical plains sites are dominated by cool-season midgrasses such as western and bluebunch wheatgrass, needlegrass, needle and thread, and the shortgrass blue grama (Carpenter 1940). Slopes feature pine and juniper with chokecherry and serviceberry understories. Riparian areas (shrubby and hardwood draws and river floodplains) are characterized

by trees such as various willows, cottonwood, green ash, elm, oak, thickets of chokecherry and buffaloberry, and understories of hawthorn, currants, and rose (Stephens 1973).

Mammals typical of the mixed-grass prairie of the Great Plains include pronghorn antelope, badger, swift fox, black-tailed jackrabbit, and a variety of ground squirrels, pocket mice, and other rodents (Jones et al. 1983). Mule deer are common in the IR-474 area (Wallmo 1981). Some elk occur in the Montana and Wyoming portions of the route (Chapman and Feldhamer 1982; Petera 1987). Similarly, isolated pockets of mountain goat and bighorn sheep are found in the route vicinity in Wyoming and/or Montana (Chapman and Feldhamer 1982; Martinka 1987). In woodlands and riparian areas, the fauna are supplemented by northern and eastern species and by widespread species such as racoon and coyote (Jones et al. 1983).

Raptors include Swainson's and rough-legged hawks, golden eagle, marsh and sparrow hawks, and prairie falcon (Williams and Matteson 1973). Grouse and dove are important game birds. Moderate numbers of geese and ducks migrate through the area. Breeding populations of Canada geese and a variety of ducks (e.g., gadwall, teals, mallard, shoveler, and ruddy duck) are found in the region, principally in Montana (Bellrose 1976). The eastern two-thirds of Montana is an important waterfowl breeding area, forming part of the northern Great Plains waterfowl management area (USFWS 1986).

Potentially occurring federally listed endangered (E) and threatened (T) species include grizzly bear (T), bison (E), northern swift fox (E), black-footed ferret (E), bald eagle (E), and American peregrine falcon (E).

B.7.2 Impact Assessment

Impacts from IR-474 to big game (elk, deer, and antelope) on yearlong ranges are expected to be low. Although these animals may exhibit fright responses on occasion, frequent injury or population declines resulting from the flights are not likely. Bighorn sheep (and possibly mountain goat) exhibit a variable response and may experience moderate impacts from overflights. Bald eagles nesting in the Bighorn Basin of Wyoming apparently have not experienced adverse effects (Petera 1987).

Although the endangered black-footed ferret may still occur in low numbers in the wild, particularly in Wyoming, there is no information indicating that low altitude flights would affect the animal adversely.

State wildlife officials have expressed some concern about elk, deer, and antelope on yearlong ranges in Wyoming (Petera 1987) and about mountain goats and bighorn sheep in Montana (Martinka 1987). Because flights may occur below 500 ft AGL, low rather than negligible impacts may occur. Given these likely effects, impacts are classified as negligible for endangered species and low for other wildlife.

B.8 LIVESTOCK AND POULTRY

B.8.1 Resource Description

IR-474 is located in an area of cattle ranching and some other livestock and poultry activity. Among all states, Montana ranks fifth for sheep-raising, twelfth for cattle, thirtieth for hogs, and fortieth for chickens; turkey is unranked and no mink farms are reported (USDA 1987). Montana counties under the route rank in the mid-range (around 27th out of 56 counties) of all Montana counties on all these measures

combined. Campbell, Converse, and Park counties are in the top ten counties for cattle and sheep raising; several of the counties rank high on other, less significant measures (e.g., hogs and chickens), indicating moderate activity.

Among all states, Wyoming ranks third for sheep, 28th for cattle, and in the forties for hogs and chickens; turkey is unranked and no mink farms are reported (USDA 1987). The counties under IR-474 rank around 12th, out of 23 counties, on all measures. Carbon, Fergus, and Yellowstone counties rank in the top ten counties for cattle and sheep raising; several of the counties rank high on other, less significant measures, indicating moderate activity.

The northwestern corner of Sioux County, Nebraska is crossed by the southern terminus of the route. The county ranks in the top half statewide on all measures (excluding mink) except hogs in a state that ranks 18th for sheep, second for cattle, fifth for hogs, 26th for chickens, and 19th for turkeys; no mink are reported (USDA 1987). Cattle raising is important (25th out of 93 counties) but the county is about average on other measures.

B.8.2 Impact Assessment

Overall, the IR-474 area exhibits moderate occurrence of livestock and poultry. Military flights would therefore be expected occasionally to frighten animals, possibly causing mortality or property damage from stampeding on an infrequent basis. Impacts are therefore considered to be low to moderate for this route. State agricultural officials have expressed no concerns.

B.9 AIR QUALITY

B.9.1 Resource Description

There are two Montana counties beneath IR-474 which are designated as non-attainment for NAAQS. Rosebud County is classified by the U.S. Environmental Protection Agency (EPA) as non-attainment for the recently superseded secondary NAAQS for total suspended particulate matter (TSP). Yellowstone County is classified by EPA as non-attainment for the carbon monoxide (CO) NAAQS, the primary NAAQS for sulfur dioxide (SO_2), and the secondary NAAQS for TSP (EPA 1989). Traffic-induced fugitive dust and possibly coal strip mine emissions are thought to be primarily responsible for the elevated TSP levels in Rosebud County. The non-attainment areas in Yellowstone County are probably caused by traffic and industries in and near the city of Billings (Raisch 1989).

There are no mandatory (designated under the Clean Air Act Amendments of 1977) PSD Class I parks or wilderness areas under, or within 6 miles of, IR-474. However, the Northern Cheyenne Indian Reservation of southern Montana, which has been redesignated a PSD Class I area, is on the southern side of the centerline of the racetrack portion of IR-474 (see Fig. B.4.1). A few square miles of the route corridor overlay this Class I area.

B.9.2 Impact Assessment

The air quality impact analysis for IR-474 indicated that incremental concentrations of air pollutants from aircraft engine exhaust on the route would be well below levels of concern for most of the area. The maximum predicted incremental concentrations for IR-474 were less than 5% of the NAAQS and PSD Class II increments (see

Table 4.1.9), which are applicable in most of the areas under this route. However, a small portion of IR-474 crosses the northern fringe of the Northern Cheyenne Indian Reservation, which has been redesignated to PSD Class I status. The dispersion model results indicated that maximum incremental concentrations of TSP, SO_2, and NO_2 along this segment of IR-474 could be from 5% to 50% of the PSD Class I increments for these pollutants. These impacts are considered to be low (Table 4.1.9), but depending on the extent of the Class I increments consumed in this area by other pollutant sources in the region, could represent an appreciable impact on the air quality resource.

C. SR-300 (CALIFORNIA, NEVADA, OREGON)

C.1 AIRSPACE

Slow speed low altitude training route 300 (SR-300) is a Military Airlift Command route in the western United States (Fig. C.1.1). The route was established on May 1, 1980, and it use is scheduled from Travis AFB, California. SR-300 begins near Sacramento in northern California, crosses over western Nevada, proceeds northward over southern Oregon and circles back over northern California. The route passes over 14 counties in California, 9 in Nevada and 3 in Oregon.

Much of SR-300 is over the Sierra Nevada chain where the terrain is very steep and rugged, especially on the western portion of the route in California. Ground level visibility is greatly restricted on this western section, due to the combination of mountainous terrain and heavily wooded landscapes. The eastern portion of SR-300 gradually becomes more level as one moves into the desert-like regions of Nevada. In general, though, most of the route covers densely wooded mountainous terrain.

SR-300 was established to provide training for MAC aircrews at low altitudes, between 300 ft AGL and 11,900 ft MSL. The route's width is 11.5 statute miles along a distance of 871.8 miles, covering an area of 10,189 sq. miles SR-300 may be scheduled 24 hrs/day, 7 days/week.

Although SR-300 is authorized for scheduling by the Air Force at all times, MAC generally schedules about 2 hrs of flying per day. In the summer route utilization matches hours scheduled, but in the winter only around 50% of the scheduled hours are utilized. The route is currently used for low altitude training for MAC's C-130s, C-141s,

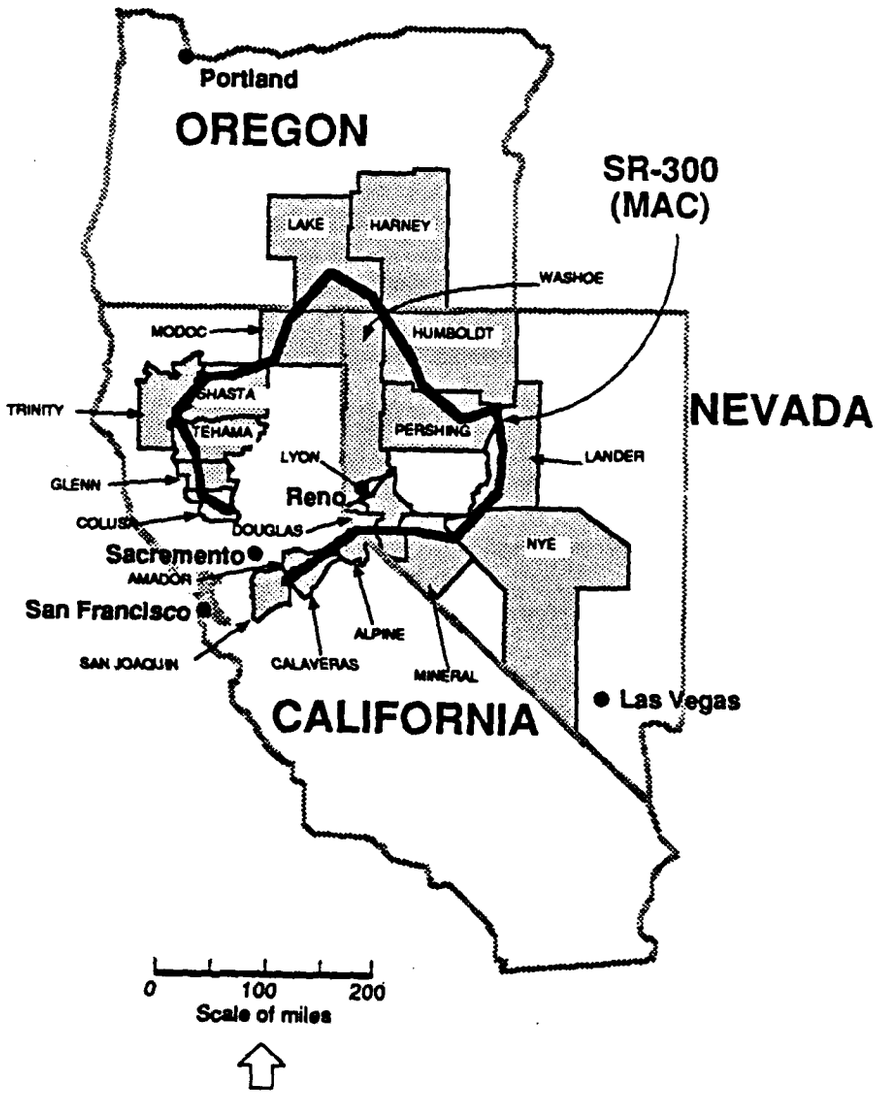


Fig. C.1.1. Map of SR-300.

and C-5s. However, at the time of assessment, 1987, the average monthly sorties scheduled on SR-300 were as follows:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
C-130	8	300	250

Generally, the MAC aircraft fly the first 1/5 of SR-300, then turn around and fly back to route's entry point. These flights normally follow SR-300's centerline.

There are at least 19 Military Training Routes and 4 Military Operations Areas that are concurrent with SR-300. The busiest of these is VR-201, a Navy route from Naval Air Station (NAS) Lemoore which had the following average scheduled monthly usage in 1986:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
F-4	804	500	550
A-7	621	500	480
F-18	410	500	550
A-4	174	500	430
F-111A	120	500	520
A-6	95	500	520

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
T-33	89	500	430
S-3	80	500	290
F-14	25	500	550
T-38	10	500	410
F-8	9	500	520
AV-8	8	500	480
F-5	2	500	520
OV-10	2	500	200
Total	2453		

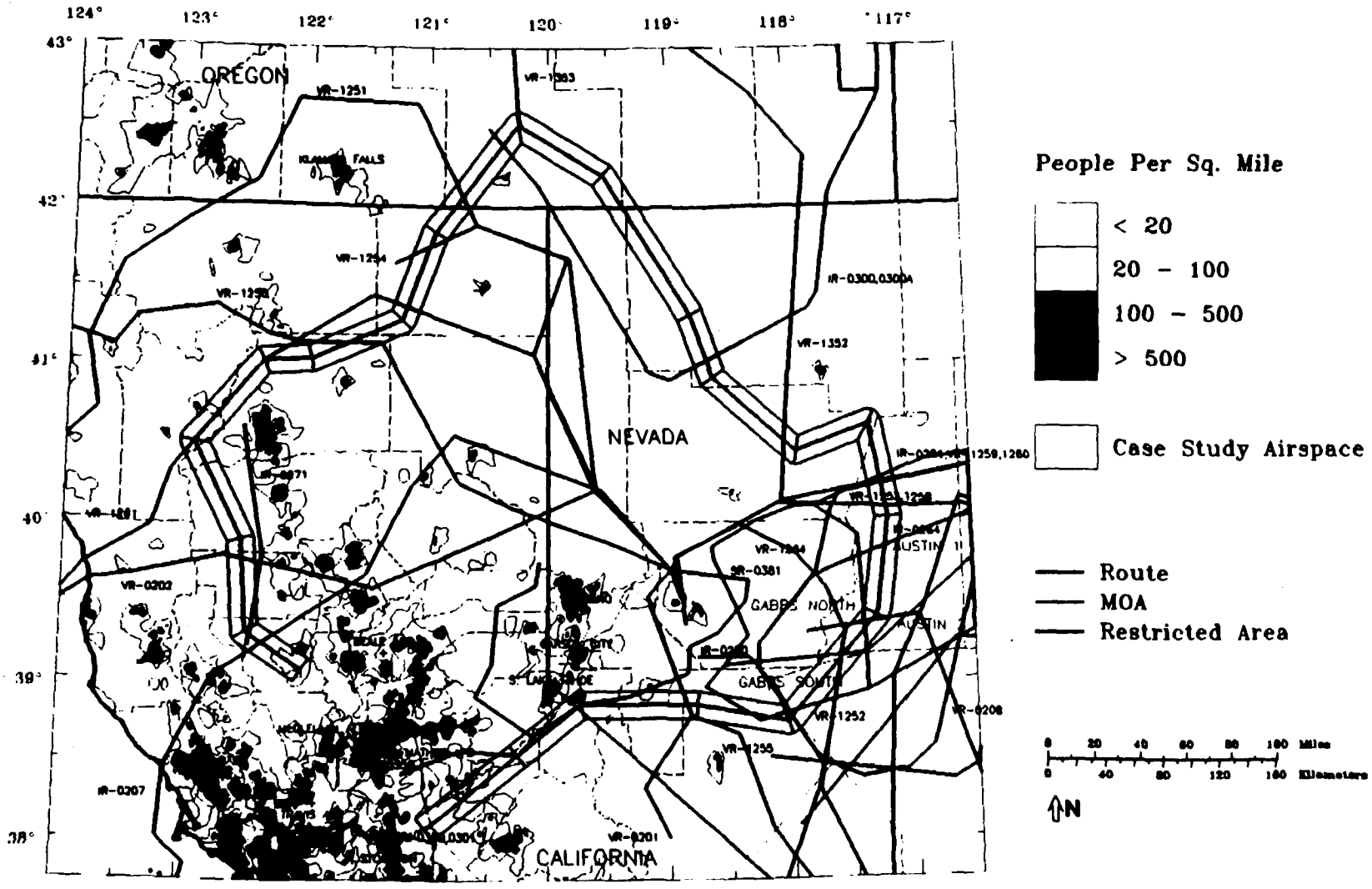
Generally, these fighter aircraft fly throughout the width of the route but have a tendency to fly in the middle half of the route.

C.2 SOCIAL

C.2.1 Resource Description

Approximately 34,000 people lived beneath SR-300 in 1980; the average population density was about 3.3 persons/sq. miles. In comparison, the average 1980 population densities for California, Oregon, and Nevada were 151.4, 27.4, and 7.3 people/sq. miles, respectively, and the U.S. density was 64.0 people/sq. miles. Figure C.2.2 depicts population distribution under SR-300. There are 30 small towns beneath SR-300 in California, the largest being Lockeford (population 1,852), Woodbridge (1,672), and Williams (1,655). There are also 5 small towns beneath SR-300 in Nevada, and the largest are Gabbs (811) and Imlay (200). Three small towns in Oregon are beneath SR-300, the largest of which is Plush (70).

Fig. C.2.2 Population distribution in the SR-300 region.



C.2.2 Impact Assessment

A total of 78 face-to-face interviews were conducted beneath SR-300. Overall, the social impacts of this route are moderate. This is because the reports of activity disruption are moderate. Annoyance under SR-300 constitutes a low impact, as do social disruption and reports of economic disruption to livestock operations. There were no reports of disturbance to young people in group facilities.

C.2.2.1 *Awareness*

Fifty-eight respondents (74.4%) were aware of low altitude military flights in the vicinity. In addition, nearly half (46 or 64%) of the 72 local government officials and newspaper editors contacted were aware of flights in the area.

C.2.2.2 *Annoyance*

Annoyance constituted a low impact under SR-300; 19 respondents (24.7%) were highly annoyed with at least one aspect of the flights. Thirteen (17.1%) were highly annoyed by the altitude of the flights and the possibility of an aircraft accident, 10 (13%) were highly annoyed by aircraft noise, and two (2.7%) by the presence of the flights.

A majority of the respondents (44 or 57.1%) reported low annoyance with the low altitude flights on all four annoyance variables. Sixty-eight (90.7%) reported low annoyance with the presence of the flights, 56 (73.7%) with the altitude, 53 (68.8%) with the aircraft noise, and 48 (64%) with the possibility of an aircraft accident.

C.2.2.3 *Interrupted activities*

Low altitude flights created a moderate impact in terms of interrupted activities, with a total of 11 respondents (14.9%) reporting sleep interruption or interruption of three or more non-sleep activities during the previous month. Seven respondents (9.5%) reported sleep disruption. Two respondents (2.7%) reported interruption of three non-sleep activities. One (1.4%) reported the interruption of four of these activities, and four (5.4%) reported the interruption of five non-sleep activities. None reported the interruption of more than five non-sleep activities. On the other end of the scale, most respondents (53 or 71.6%) reported no interruption of non-sleep activities, 8 (10.8%) reported the interruption of one non-sleep activity, and 6 (8.1%) reported the interruption of two such activities.

C.2.2.4 *Community disruption*

One (1.4%) of the key informants was aware of community disruption resulting from the low altitude flights, indicating a low impact level.

C.2.2.5 *Disturbance of young in group facilities*

None of the local officials or newspaper editors had received complaints regarding the disturbance of the very young in group facilities. This indicates a negligible impact. No one interviewed face-to-face mentioned disturbance of children as something they dislike about the flights.

C.2.2.6 *Reduced livestock productivity*

Six (8.3%) of the local officials and newspaper editors were aware of reported losses in productivity from commercial livestock operations (a low impact). Also, 4 field respondents said the flights disrupted domestic animals.

C.2.2.7 *Impact indicators*

Three respondents (5.2%) previously had made one or two formal complaints about the flights. Fifteen (19.7%) reported informal complaints to friends or family. Three of these had complained more than once a month, one had complained between once a month and three times a year, and 11 had complained three times a year or less. In addition, 30.1% of the local officials and newspapers had received complaints about the flights.

Overall, seven respondents (11.9%) beneath SR-300 either were opposed or strongly opposed to the flights. Twenty-six (44.1%) neither opposed nor supported the overflights, and 26 (44%) either supported or strongly supported these activities.

C.3 NOISE

C.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP, the L_{dnmr} for SR-300 is 51.8 dB at centerline and 51.5 dB at 3 miles from centerline (Fig. C.3.1). Thus, the noise level generated by these flying

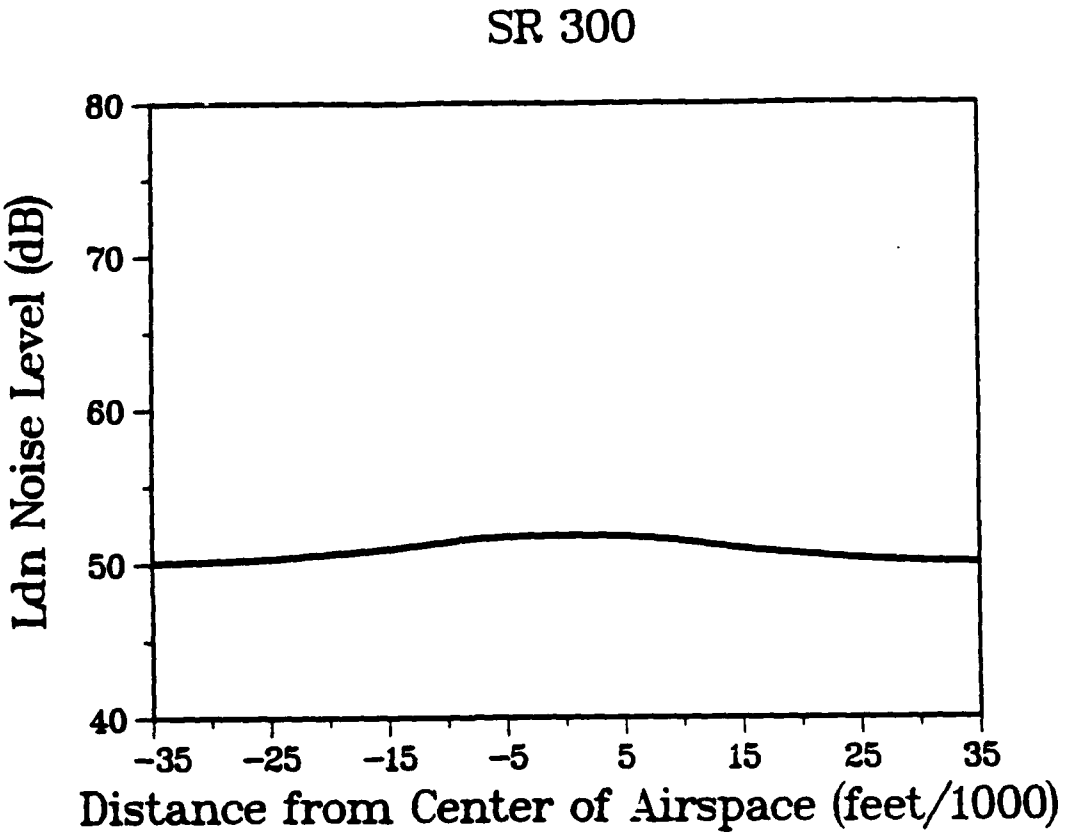


Fig. C.3.1. L_{dnmr} levels for SR-300.

operations is a little higher than ambient level. Beneath the area where SR-300 and VR-201 are concurrent, the L_{dnmr} is 71.1 dB at the centerline of SR-300 and 70.1 dB 3 miles from centerline.

The maximum SEL for SR-300 is 99.8 dB at centerline and 57.2 dB 3 miles from centerline. Beneath the area where SR-300 and VR-201 are concurrent, the maximum SEL is 124.1 dB at centerline and 81.5 dB 3 miles from centerline.

C.3.2 Impact Assessment

The use of SR-300 alone results in rather moderate noise levels, approximately 52 dB L_{dnmr}. This level is associated with a very small (2 to 3%) level of persons highly annoyed; a level of 52 dB is well below the level required to affect human health by means of an added stress. However, the area where SR-300 is concurrent with VR-201 represents a potential high level of annoyance in addition to a small added potential risk to individuals predisposed to hypertension. It is anticipated that, in the area of concurrent use, approximately 25% of the affected populations are highly annoyed and that there may be widespread complaints and threats of legal action. Further, there is an addition of about 10% to the relative risk of hypertension. A careful survey of the affected area will determine the number of people potentially affected. It must be stressed that this estimate of 10% should be taken only as an indication that considerable care should be taken in examining the population characteristics of the area and in providing a careful review of the response of the persons overflown. The human health impact level of moderate in the concurrent airspace associated with the 71 L_{dnmr} is sufficient to indicate mitigative action, as described in Appendix C.

C.4 AMERICAN INDIANS

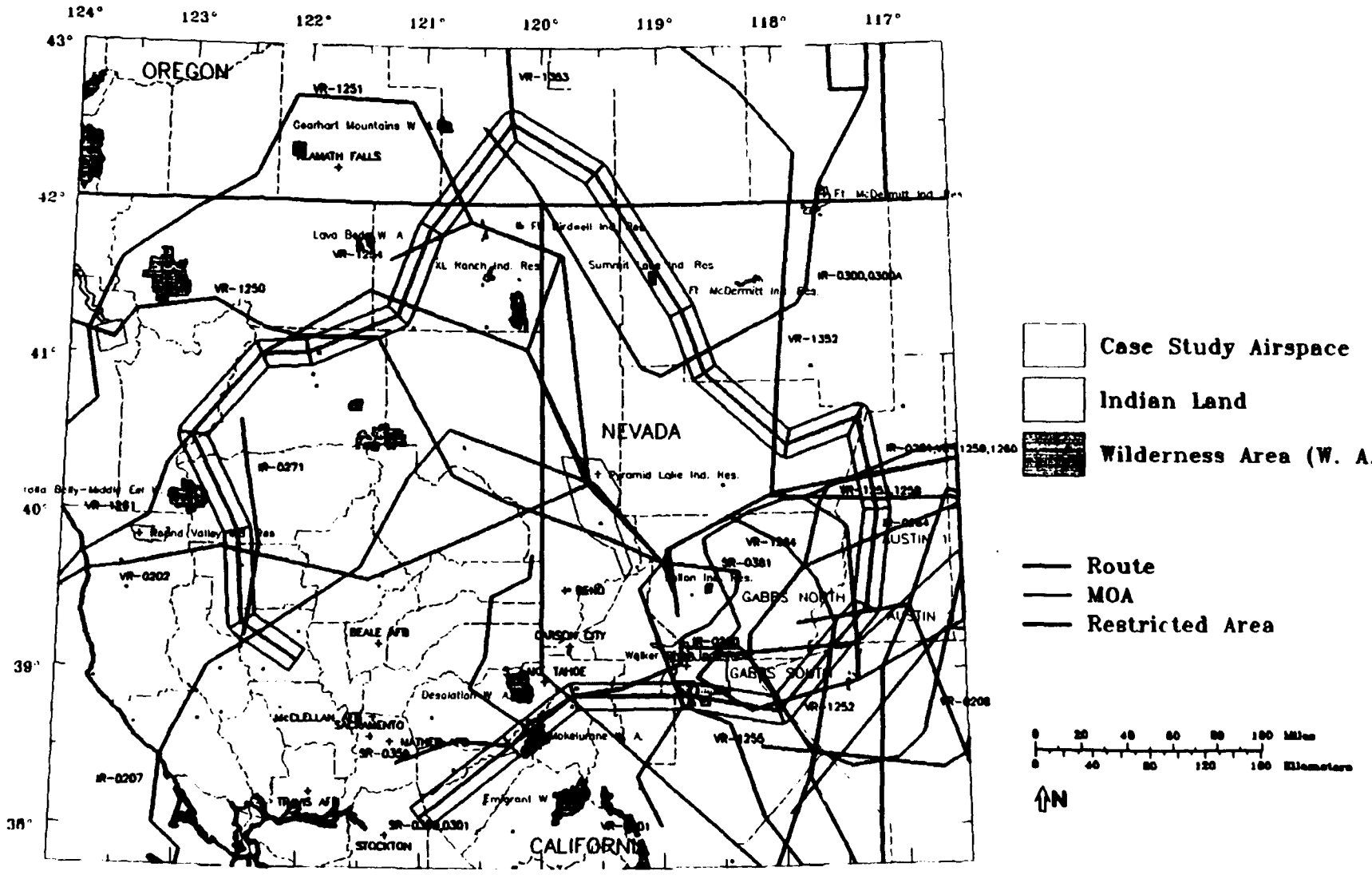
C.4.1 Resource Description

The principle sovereign reservations located under SR-300 include the Walker River and Summit Lake Paiute Reservations. Also included are the Washoe Carson Colony (pop. 243) and Washoe Dresslerville Colony (pop. 298) in Nevada, and the Big Bend Rancheria of the Pit River Indians (pop. 6), the Grindstone Indian Rancheria (pop. 143) and the Winton Walaki Rancheria in California. Some residents of the Yomba Shoshones live in the mountains of the Toyiabe National Forest located underneath the route.

Initial contacts with the Nevada Indian Commission, the Western Shoshone Council and the Walker River Paiute indicated that the impacts and perceived risks resulting from Air Force activities under specific routes could not be isolated from those of other routes, and even of other branches of the military. Upon their recommendation the Fallon Shoshone-Paiute and Pyramid Lake Paiute were therefore contacted, in order to insure that the full range of regional impacts be identified. Even though the reservations do not lie under SR-300, they are located under other low altitude airspaces. Figure C.4.1 depicts these tribes' reservations as well as other federally protected areas in relation to SR-300.

The Nevada Tribes are part of the Great Basin Culture Area, (Kroeber 1939) which also includes tribes in Utah, southern Idaho, and southeastern Oregon. This area is delineated in part by cultural similarities among the Indians, and by ecological constraints on the kinds of adaptations available to them (D'Azevedo 1986). The California rancherias are part of the California Great Basin Culture Area (Kroeber 1925). This designation is accepted today (Heizer 1966), although with qualifications.

Fig. C.4.1 Federally protected areas in the SR-300 region.



The Nevada tribes treated in the assessment of SR-300 are described in more detail below. The Summit Lake Paiute Reservation consists of 10,506 acres. While the tribal enrollment totals 66, the reservation's 11 residents make a living primarily through funds received from grazing rights. Tribal government consists of five members elected to serve 3-year terms.

Located approximately 60 miles southeast of Reno, Nevada, the Fallon Reservation was established by treaty in 1902. Its total acreage is 5480. Most of the 737 Indian residents make a living either at the nearby Naval Air Base town of Fallon, through cattle ranching on irrigated pasturage or through service or administrative employment in the tribal government. The residents are settled primarily either in the village of Fallon itself or on the ranches surrounding the village.

Established in 1859 and confirmed by executive order in 1874, Walker River is one of the oldest reservations of the Great Basin. Located 30 miles south of Fallon, Nevada, the 320,510 acres of reservation land is used mostly for ranching. Almost all the 830 Indian residents live in or close to the town of Schurz. In addition to ranching, residents are employed primarily by the Hawthorne Army Ammunitions Depot, tribal government, or the Indian Health Service.

Like Walker River, Pyramid Lake was confirmed by executive order in 1874. The reservation is located 35 miles northeast of Reno, Nevada on 475,085 acres of the aboriginal lands of the Northern Paiute. The Indian resident population is 1370. Fishermen in the middle of the desert, the people of Pyramid Lake identify strongly with the lake and the cui-ui, a fish inhabiting it. The people are called Kuyuidokado, or 'cui-ui eaters'. Fishing is still used to supplement their subsistence, while employment

is provided by the tribe, its recreational development and smoke house, the fish hatcheries, ranching, small businesses and mining.

The 4,682 acre Yomba Reservation is located approximately 140 miles east of Reno, Nevada. Yomba was established by executive order in 1937 and consists of land which was purchased from a private rancher who still resides on the land. With a population of 187, Yomba residents make a living primarily through cattle ranching and through service or administrative employment in the tribal government. The residents are settled primarily either in the village surrounding the tribal offices or on the ranches outside the village.

C.4.2 Impact Assessment

The Walker River and Summit Lake reservations are located beneath SR-300. The most serious impacts appear to be effects on the quality of life and tribal sovereignty.

C.4.2.1 *Positive*

Potential positive impacts include the perception that there is a direct connection between low altitude flights and the employment benefits from the naval base, as well as the inspirational value of the flights. While little different in impact from what would occur in non-Indian populations, the extremely depressed economic status of Indian reservations make those contributions especially dramatic.

C.4.2.2 *Sovereignty*

Adverse impacts to tribal sovereignty have resulted from the Air Force's tendency not to inform the tribes or listen to concerns on a regular basis. This issue is probably the

most important concern expressed for this case study as some of the tribes feel they have little control over their own affairs, and tribal leaders are not able to address the questions of their people concerning aircraft activity.

C.4.2.3 *Religion*

Three forms of traditional religious activities have been interrupted by low altitude aircraft activity. They are the prayers of thanksgiving associated with pine nut harvesting, gathering of sacred herbs, and hunting of animals and harvesting of fish; the solitary fasting and meditation, which must occur in isolation from manmade sounds; and the tribal ceremonials. Manmade noise could cause a prayer to be misdirected, resulting in a possible dangerous misdirection of power. The consequences of the misdirection of prayer in Indian religion is more serious than Judeo-Christian tradition because prayer is conceived as an immediate manipulator of power. Disruption of meditation and fasting would spoil the activity causing it to have to be redone, while disruptions of celebrations are considered a nuisance. There is also evidence that religious ceremonies have been disrupted by the passage of low altitude flights.

C.4.2.4 *Economy and subsistence*

Concern was expressed over interference with pine-nut harvesting in the mountains during the fall. While similar to non-Indian recreational activities the severity of these impacts is increased by the important subsistence and religious contexts within which these activities are conducted.

C.4.2.5 *Family quality of life*

The potential adverse impacts to families center on the importance of the elderly and their concerns about being frightened by low altitude flights. Some elderly individuals, particularly at Walker River, were concerned because the flights were unpredictable and it was impossible to become accustomed to them.

According to Table 4.4.1, impacts to Indians under SR-300 are categorized as moderate. The most severe impacts follow from potential degradation of sovereignty and to the quality of life of families. Severity will be affected by the context of ongoing relationships between Indians and non-Indians, ranchers, developers, conservationists, and other Indian tribes over water rights, land use rights as well as overall relationships between Nevada residents and the military.

C.5 STRUCTURES

C.5.1 Resource Description

Typical structures under SR-300 include one and two story frame buildings; one and two story masonry and adobe buildings; mobile homes; frame barns, outbuildings, and water towers; and prefabricated metal buildings The building stock is typical of that found in more arid areas of the western states.

C.5.2 Impact Assessment

SR-300 itself has a very low use factor and would not be expected to incur any structural damage. However, some concurrent use areas are quite highly utilized. For example, VR-201 has about 2,400 sorties per month, mostly with lighter aircraft.

However, the aircraft are not "heavy" types, and thus, there are no anticipated adverse effects on structures. Based on GEIS findings (Appendix E), it is unlikely that any noticeable damage to typical structures in the area, including cracked walls or foundations or broken windows, could be expected to result from the Air Force's current low altitude flying operations.

C.6 WILDERNESS AND PARKS

C.6.1 Resource Description

In Nevada, an estimated 87% of the state is federally-owned, so the principal contenders for land ownership are other branches of the federal government. Thus, much of the land under consideration for wilderness or national park status may be land desired by the military. Indeed, the military, and not simply the Air Force, is considered as a contender.

Specially protected areas and Wilderness Study Areas beneath SR-300 include: Toiyabe National Forest, Yoller Bolly-Middle Eel Wilderness Area, Mokelumne Wilderness Area, Stillwater National Wildlife Refuge, and Sheldon National Wildlife Refuge (Fig. C.4.1). Wilderness Study Areas under SR-300 include Burbank Canyons NV-030-525A, Gabbs Valley Range NV 030-407, North Black Rock Range NV 020-622, and Black Rock Desert NV 020-620.

Areas affected by concurrent routes include but are not limited to: Ruby Mountains and Humboldt National Forest, Death Valley National Monument, Marble Mountain and Trinity Gap National Wilderness Area, and Wilderness Study Areas Fox Range 020-014, Stillwater 030-104, Clan Alpine Mountains 030-102 and Desotoya Mountains 030-407.

C.6.2 Impact Assessment

Officials or members of wilderness advocacy groups that were consulted included representatives of Nevada Conservation Organization, The Rural Coalition, Citizen Alert, a Nevada chapter of the Sierra Club, The Wilderness Society, The Nature Conservancy, Nevada Outdoor Recreation Association (NORA), and Nevada State Parks as well as individual wilderness users.

Reported concerns included the potential disruption of solitude in instances when wilderness users were hiking or camping in the Ruby Mountain area, at Eureka Dunes, and in wilderness areas in the Sierra Nevadas. The most important concern reported, however, was the risk associated with the potential degradation of land status due to low altitude flights. Proponents of this concern argued that with frequent use of low altitude airspace, the pristine attributes of the environment may be degraded to such a point that the area would no longer be eligible for consideration as a wilderness area or national park. The wilderness concerns in Nevada, in particular, are aggravated by the large amount of federal land and the substantial amount of low altitude airspace for which the military has priority.

Impacts to wilderness character intensify in severity because of resulting interference with visual and auditory features which characterize some of these wilderness areas. Severity also intensifies if consultation between the Air Force and government caretakers is insufficient in the planning of associated airspaces. Threats to safety and caretaker operations were not cited as a major problem, though their concern was raised. Officials raised concerns about effects of military activities on wildlife, particularly rabbits and small game.

C.7 WILDLIFE

C.7.1 Resource Description

Hundreds of wildlife species, including threatened or endangered animals and important game species as well as non-game species, inhabit areas affected by aircraft flying SR-300. In 1979 it was estimated that more than 6 million ducks wintered in California's Central Valley. Typically, duck numbers begin to increase in early August and peak during December, but by mid-April they have returned to the summer population of 250,000. Also, up to 1 million geese of various species occur in the Central Valley during the winter. An estimated 40,000 tundra swans also winter in California. Lakes and reservoirs larger than 100 acres can be presumed to support seasonal concentrations of birds, and some, such as Eagle Lake in Lassen County, support thousands of nesting waterbirds (coots, grebes, waterfowl, gulls) during the breeding season. Numerous state wildlife areas and national wildlife refuges that provide extensive waterfowl habitat are located in the Central Valley and the Great Basin on the northern California border. Significant breeding grounds for the sandhill crane are located in and near the Ash Creek Wildlife Area in Modoc and Lassen counties. A significant migratory flight path of sandhill cranes, which regularly fly at 400-500 ft AGL, is located adjacent to SR-300 south of Lake Tahoe (Bontadelli 1987).

In Nevada, SR-300 includes approximately 65% of the state's relatively few productive wetlands for waterfowl. These wetlands are major staging grounds for migrating shorebirds (e.g., sandpipers) and provide habitat for breeding waterfowl including the mallard, redhead, and cinnamon teal. Canada geese, snow geese, and many species of ducks migrate through and winter in the area. The largest breeding colony of white-faced ibis in the United States is located in the area (Burgoyne 1987). In Oregon,

portions of the route near Valley Falls and Plush are near high concentrations of waterfowl during spring and fall migration.

Important upland wildlife in the SR-300 region include several species of game birds (e.g., California quail, chukar, and sage grouse) and many species of game and furbearing mammals. Unlike birds associated with water, however, important upland game birds and mammals generally do not concentrate in large numbers. Pronghorn occur in open areas of valleys and plateaus, primarily in the northern two-thirds of the SR-300 region. Bighorn sheep occur in a few areas in northeastern California, southeastern Oregon, and in Nevada in the areas of Hell Creek, Granite Mountain, and Granite Peak, and in the Stillwater and Clan Alpine mountain ranges (Molini 1987). Bighorns inhabit steep areas, and the ewes tend to choose the most precipitous areas to lamb. Mule deer, grey fox, and bobcat are common in mountain ranges. The kit fox, which has very sensitive hearing for nocturnal hunting, is common on valley floors and alluvial fans, primarily in central California, Nevada, and extreme southeastern Oregon (Chapman and Feldhamer 1982; Burgoyne 1987).

Endangered bird species that occur under or near SR-300 in California include the peregrine falcon and the bald eagle (El Dorado, Lassen, Modoc, Shasta, Siskiyou, and Trinity counties). Mountainous parts of central and northern California support much of the nesting, foraging, and wintering habitats of these birds. Bald eagle nesting and foraging areas that lie beneath SR-300 in California are the North Fork Willow Creek watershed in Modoc County, McCloud Reservoir and Iron Mountain Reservoir in Shasta County, the Stony Gorge Reservoir in Glenn County, and the East Park Reservoir in Colusa county (Bontadelli 1987). Most of California's 800+ overwintering bald eagles are associated with lakes and reservoirs. The California condor, currently is known to exist only in captivity, historically occurred in the SR-300 area, and may be re-established in the future.

Bald eagles also winter in Nevada at all major lakes and wetlands under SR-300, which are located primarily in the 8,422 sq. miles Lahontan Basin in the western part of the state. The greatest concentration of eagles is on the Stillwater National Wildlife Refuge. Peregrine falcons are also commonly seen in the Lahontan Basin.

Other listed species which may occur are the Aleutian Canada goose (E), the San Joaquin kit fox (E), and the blunt-nosed leopard lizard (E).

C.7.2 Impact Assessment

The 872 mile long SR-300 passes over regions having important waterfowl (ducks, geese, swans) breeding and wintering areas in central and northern California and western Nevada. Within these regions in California, SR-300 avoids all significant waterfowl wintering areas (1000 acres or greater) and all state and federal waterfowl areas as shown on a map supplied by the California Department of Fish and Game (CDFG) (Bontadelli 1987), with the exception of the Colusa National Wildlife Refuge. This refuge lies approximately 2 miles NE of the SR-300 centerline at the end of the route and could be overflown if aircraft stray away from the centerline. The CDFG has reported several sensitive areas under SR-300 where bald eagles and sandhill cranes could be affected (Bontadelli 1987).

Areas under SR-300 in Nevada include approximately 65% of the state's productive wetlands for waterfowl. Many waterfowl species winter in large numbers in this area, and smaller numbers remain in the spring to breed. The Nevada Department of Wildlife (NDW) believes that waterfowl nesting success on some individual wetlands may be reduced due to disturbances associated with low altitude aircraft flights (Burgoyne 1987). The NDW also states that aircraft may frighten or disturb migrating snow geese and

shorebirds, wintering bald eagles and peregrine falcons, and a breeding colony of white-faced ibis.

NDW had several concerns for big and small game species. Observations by staff at the Sheldon National Wildlife Refuge suggest that pronghorn are sensitive to low flying aircraft. Desert bighorn sheep may be intensely exposed to low altitude flight because they inhabit steep areas at high elevations, and the ewes often choose the most precipitous areas to lamb. Quail and chukar partridge may be sensitive to flights during the brood-rearing season. Other important species mentioned by NDW as being possibly impacted were sage grouse, mule deer, snow geese, dowitcher, bobcat, grey fox, and kit fox.

Slightly more than a tenth of SR-300 (106 miles in southern Lake County) affects Oregon. In this area, low altitude flying operations are not expected to have significant impacts on big or small game species. High concentrations of migrating waterfowl occur in areas near the route and could experience some effect and be a hazard to aircraft (Denney 1987). In view of the confluence of the route with important wildlife resources in Nevada and the consequent concerns of NDW, impacts are classified as moderate for endangered species and other wildlife.

C.8 LIVESTOCK AND POULTRY

C.8.1 Resource Description

Of the California counties underlying SR-300, Stanislaus County was reported among the leading counties for five different livestock and poultry commodities (Table C.8.1). Siskiyou, San Joaquin, and Tehama counties each had one commodity for which they were among the leading counties. Only small areas in San Joaquin and Stanislaus

Table C.8.1. Livestock and poultry rankings for SR-300 in California, Nevada, and Oregon: National and state rankings and leading counties[a]

	Rank N	Rank S	Leading counties (58 in California)
California			
Cattle and calves	7	2	Imperial, Fresno, Tulare, Kings, Siskiyou, Merced
Milk and cream	2	1	San Bernardino, Tulare, Stanislaus, Merced, Riverside
Chickens	9	13	Merced, Stanislaus, Fresno, San Bernardino, Sonoma
Eggs, chicken	1	14	Riverside, San Bernardino, Stanislaus, San Diego, San Joaquin
Hogs and pigs	29	48	Tulare, Merced, Stanislaus, Butte, San Joaquin
Sheep and lambs	2	32	Kern, Solano, Imperial, Merced, Tehama
Turkeys	3	19	Fresno, Madera, Stanislaus, Merced, Kings
Wool	3	60	Kern, Imperial, Merced, Fresno
Honey and wax	4	59	Imperial, Kings, Tulare, Fresno, Riverside
Nevada			Leading counties (17 in Nevada)
Cattle and calves			Humboldt, Churchill, Lyon, Washoe, Pershing, Douglas
Milk			Clark, Churchill, Douglas, Lyon
Sheep and lambs			White Pine, Elko, Pershing, Lyon, Humboldt
Oregon			Leading counties (36 in Oregon)
Cattle and calves	27		Malheur, Harney, Lake, Klamath, Baker, Umatilla
Milk and cream	27		Tillamook, Marion, Malheur, Coos, Washington, Linn
Chickens	27		Clackamas, Marion (other counties far below)
Eggs, chicken	28		NR
Hogs and pigs	32		Marion, Umatilla, Yamhill, Clackamas, Washington, Linn
Sheep and lamb	9		Douglas, Linn, Umatilla, Coos, Curry, Klamath

[a]Explanation: National rank (N) is the ranking among states; State rank (S; California only) is the rank among the cash value of all California commodities; Leading counties are listed in order from highest to lower value of livestock and poultry; Underlined counties are those underlying the low altitude flight route. Although Nevada reported data on chickens, chicken eggs, hogs, wool, and honey, these commodities were not ranked and leading counties were not reported; no turkey data were reported. Oregon did not report ranks or leading counties for turkeys, wool, or honey; some production data were reported for mink.

Sources: CDFA (1986, 1988); NASS (1988); USDA (1987).

counties are affected. Siskiyou and Tehama counties are located in northern California; Siskiyou is a leading county in cattle and calves, and Tehama is a leading county in sheep and lambs.

Most of Nevada's leading counties for livestock production are located in the state's northwestern one-quarter through which SR-300 passes (Table C.8.1). The route does not pass through the state's top counties for milk and sheep, Clark and White Pine, respectively. Minimum altitude is 300 ft for the entire length of SR-300 in Nevada.

In Oregon, SR-300 traverses primarily Lake County, a large county in southcentral Oregon. In two other Oregon counties, Harney and Klamath, the total length of the route centerline is only 0.3 mile. All three counties are leading counties in cattle and calves, and Klamath is also a leading county in sheep and lambs. As many as 50,000 cows and bulls may be pastured in Lake County annually from April to October, when breeding takes place (Kosesan 1987). No leading counties for milk, chickens, or hogs are under SR-300. Total length of the route in Lake County is 106 miles at the minimal route altitude. Although Oregon ranked 5th among the states in mink production in 1986 and 1987 (USDA 1988), Lake County has few, if any, mink ranches (Carr 1989).

C.8.2 Impact Assessment

The 872 mile long SR-300 intersects areas having most or all types of livestock and poultry raised in this region of the country. High production areas in California include Stanislaus County for milk products, eggs, hogs, and turkeys; Siskiyou County for cattle; and Tehama County for sheep. All Nevada counties traversed by SR-300 are highly productive for cattle. Other high production areas include Churchill, Douglas, and Lyon counties for milk products, and Pershing, Lyon, and Humboldt counties for sheep. Lake County in southern Oregon is highly productive for cattle.

Specific concerns mentioned by the California Department of Food and Agriculture included stampeding, dehydration due to livestock being scared away from waterholes, breeding problems, birth defects, and health effects of non-ionizing radiation from radar guidance systems (Neuman 1987). The principal concern in Nevada was for detrimental effects on livestock including cattle and sheep and a need for scientific data showing that such effects would not occur (Anderson 1987). Specific concerns expressed by the Oregon Department of Agriculture were for pastured cattle, which breed from April to October and are frequently nervous during this time. Low altitude flights could cause the animals to stampede, break through fences, and injure themselves (Kosesan 1987). In view of these concerns in conjunction with the absence of documented losses, impacts are classified as low for both livestock and poultry.

C.9 AIR QUALITY

C.9.1 Resource Description

SR-300 crosses a number of counties in California, Nevada, and Oregon. The EPA lists one of these counties in California (San Joaquin) and five in Nevada (Humboldt, Lander, Lyon, Mineral and Washoe) as non-attainment for the recently-superseded NAAQS for TSP, two Nevada counties (Washoe and Douglas) as being non-attainment for the NAAQS fo. CO, and one California county (San Joaquin) as being non-attainment with respect to the NAAQS for ozone (O_3) (EPA 1989).

The Mokelumne Wilderness and the Yolla-Bolly-Middle-Eel Wilderness areas in California (see Fig. C.4.1) are PSD Class I areas within 6 miles of SR-300. The latter touches the very fringe of the route corridor. However, most of the Mokelumne

Wilderness area lies under the route, with the centerline of SR-300 passing just off the northwest edge of the wilderness, within 0.5 mile of the boundary.

C.9.2 Impact Assessment

The air quality impact analysis for SR-300 indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be well below levels of concern for the area. The maximum predicted incremental concentrations for SR-300 were less than 5% of the NAAQS and PSD Class II increments, which are applicable over most areas under this route. However, the route centerline passes within 1 km of the Mokelumne Wilderness, a PSD Class I area south of Lake Tahoe. Most of the Mokelumne Wilderness is covered by the SR-300 route corridor, which is defined as being 5 nautical miles (approximately 9.2 km) either side of the route centerline. Although other segments of SR-300 had somewhat higher predicted concentrations of NO_2 and TSP, for the segment over the Mokelumne Wilderness, the maximum predicted concentrations were less than 5% of any PSD Class I increment. The reasons for the higher concentrations along other segments of SR-300 are that there are other routes concurrent with these other segments, and some of the concurrent route segments had lower minimum altitude requirements than the SR-300 segment over the Mokelumne Wilderness. Thus, the air quality impacts of SR-300 are considered to be negligible (Table 4.1.9) with respect to all NAAQS and PSD increments.

D. SR-771 (WISCONSIN)

D.1 AIRSPACE

Slow speed low altitude training route 771 (SR-771), established April 1, 1976, is an Air Force Reserve training route in Wisconsin scheduled by the 440th Tactical Airlift Wing, Billy Mitchell Field, Milwaukee (Fig. D.1.1). SR-771 crosses 17 counties in the southwestern portion of Wisconsin as it circles clockwise from Madison to LaCrosse and then back to Madison.

Wisconsin is located in the Central Lowland region of the United States, and the terrain beneath SR-771 is rolling pasture land although there are some large hills interspersed throughout the landscape. A principal land use is dairy farming. Visibility of aircraft to people or animals is restricted somewhat due to the topography and the abundance of wooded areas.

SR-771 was established to provide training for AFRES aircrews at low altitudes between 300 ft AGL and a maximum altitude of 1,500 ft AGL. The route's width varies between 9.2 and 11.5 statute miles along a distance of 293 miles, covering an area of 3,256 sq. miles SR-771 is available for scheduling from 4:00 p.m. to 9:30 p.m. local time Tuesday through Friday, and from 9:00 a.m. to 4:00 p.m. on weekends (the airspace is not available on Mondays).

Although SR-771 is available to the Air Force between 4 p.m. and 9:30 p.m. every weekday except Mondays, the AFRES typically schedules and uses it only about 1 hr and 45 min per week. In an average month in 1986, the 440th Tactical Airlift Wing scheduled about 34 sorties for its C-130 aircraft crews. These aircraft typically fly approximately 300 ft AGL at about 250 mph.

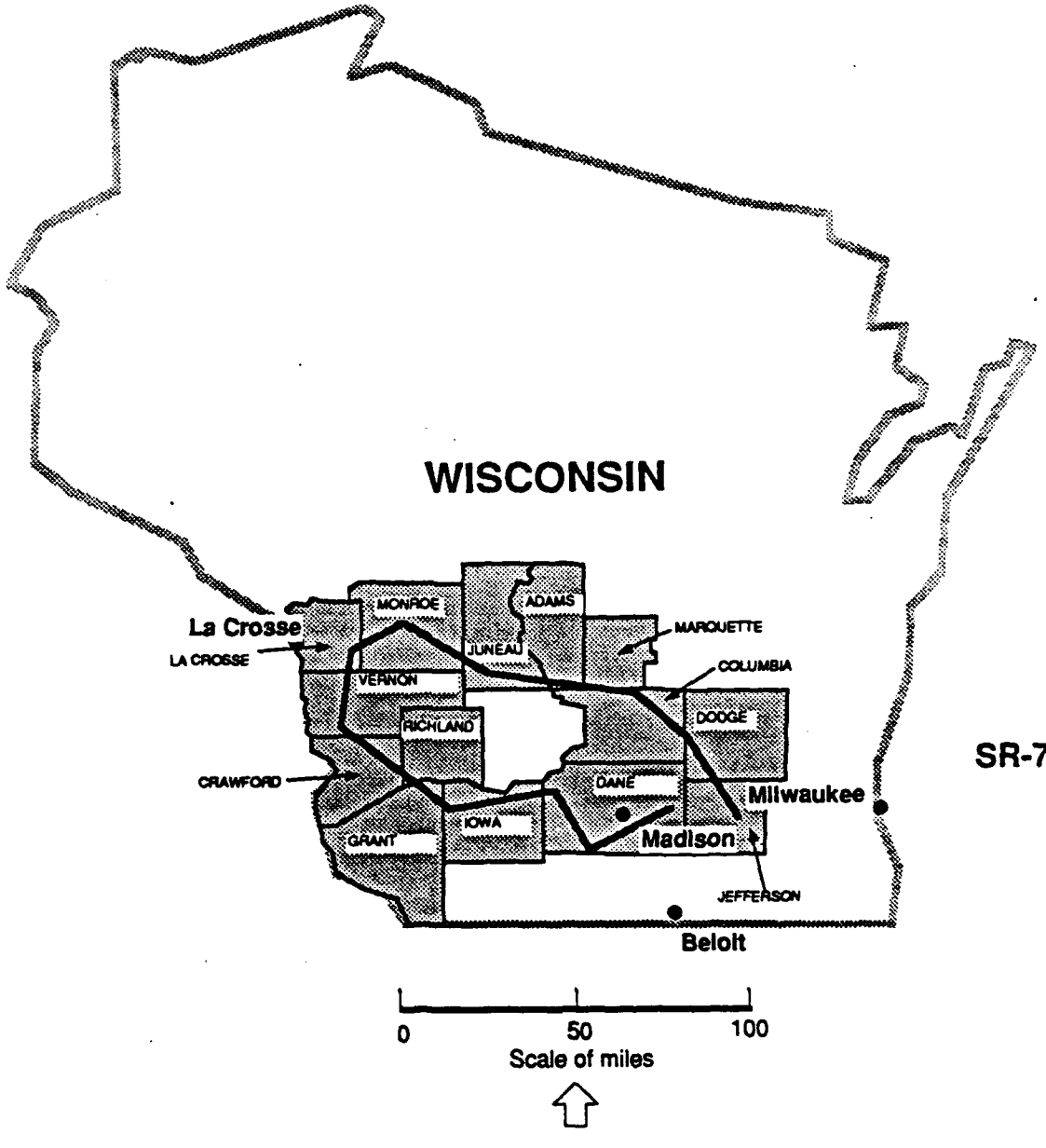


Fig. D.1.1. Map of SR-771.

There are three MTRs and one RA which are concurrent with SR-771. The busiest of these is R-6901, a RA used in conjunction with an Army gunnery range scheduled from Fort McCoy. R-6901 had the following number of aircraft sorties scheduled in the average month in 1986:

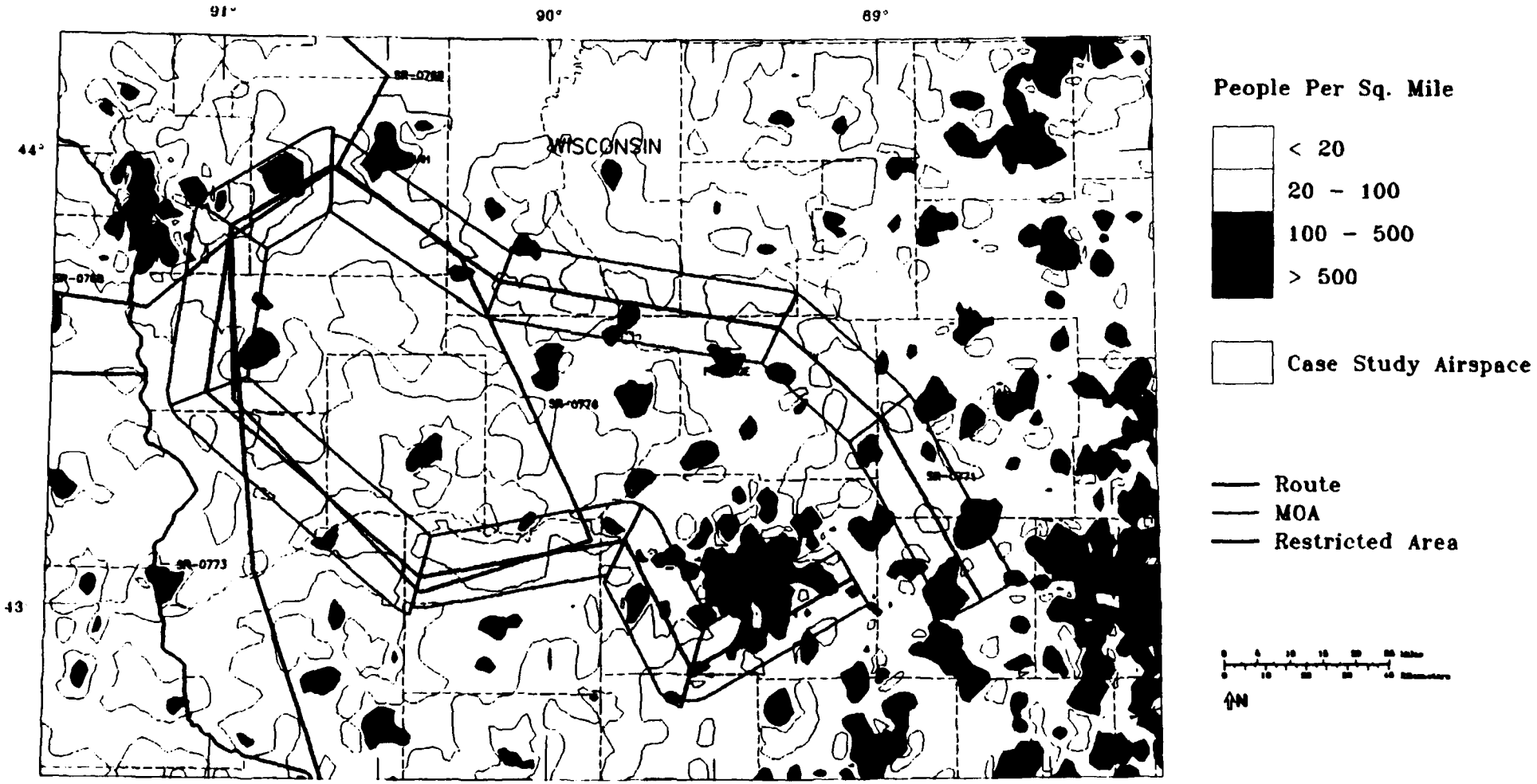
Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
H-1	Used every day throughout range	50	130
A-10	176	300	340
C-130	6	300	250
Total	182+		

D.2 SOCIAL

D.2.1 Resource Description

Approximately 171,000 people lived beneath SR-771 in 1980; the average population density was approximately 52.5 persons/sq. miles. In comparison, the average population density for Wisconsin in 1980 was 86.5 people/sq. miles, and the U.S. density was 64.0 people/sq. miles. Figure D.2.2 portrays population distribution under SR-771. There are 61 towns beneath SR-771, the largest being Watertown (population 18,400), Portage (7,896) and Sparta (6,934).

Fig. D.2.2 Population distribution in the SR-771 region.



D.2.2 Impact Assessment

A total of 99 face-to-face interviews and 127 telephone interviews were conducted beneath SR-771. Analyses of case study data indicate that low altitude flights cause moderate impacts beneath this airspace. Both annoyance and activity disruption reached moderate levels, though low levels of community disruption and economic disruption of livestock productivity were reported. Disruption of young children in group facilities was negligible.

D.2.2.1 *Awareness*

Most people contacted (84, or 84.8%) of field respondents and 94, or 74% of the key informants) were aware of low altitude military flights in the vicinity.

D.2.2.2 *Annoyance*

Annoyance was a moderate impact beneath SR-771. Twenty-eight respondents (28.6%) were highly annoyed with at least one aspect of the low altitude flights. Safety and the altitude of flights were the main concerns, as 20 respondents (20.6%) were highly annoyed by the possibility of an aircraft accident and 18 (18.4%) by the altitude of the flights. In addition, respondents (8.4%) reported annoyance with aircraft noise, and 7 (7.1%) by the presence of the flights.

The majority of respondents (52, or 53.1%) reported low annoyance with the low altitude flights on all four annoyance variables. Eighty-one (82.7%) reported low annoyance with the presence of the flights, 68 (69.4%) with the altitude, 63 (64.9%) with the possibility of an aircraft accident, and 61 (64.2%) with the aircraft noise.

D.2.2.3 *Interrupted activities*

Activity disruption constituted a moderate impact beneath SR-771, with 18 respondents (18.4%) reporting sleep interruption or interruption of three or more non-sleep activities during the previous month. Eight respondents (8.4%) reported sleep disruption. Five respondents (5.1%) reported the interruption of three non-sleep activities. Three (3.1%) reported the interruption of four of these activities, three reported the interruption of five non-sleep activities, and three reported the interruption of six non-sleep activities. On the other end of the scale, most respondents (55, or 56.1%) reported no interruption of non-sleep activities, 17 (17.3%) reported the interruption of one, and 12 (12.2%) reported the interruption of two non-sleep activities.

D.2.2.4 *Community disruption*

Three (2.4%) of the local officials and newspaper editors contacted were aware of community disruption resulting from the low altitude flights, indicating a low impact level.

D.2.2.5 *Disturbance of young in group facilities*

None of the local officials and newspaper editors had received any complaints regarding the disturbance of the very young in group facilities beneath SR-771. This indicates a negligible impact. Further, one field interviewee disliked the flights because they disturb children.

D.2.2.6 *Reduced livestock productivity*

Ten (7.9%) of the local officials and newspaper editors interviewed were aware of reported losses in productivity from commercial livestock operations beneath SR-771. This indicates a low impact. Five respondents interviewed face-to-face indicated that the aircraft disturb domestic animals.

D.2.2.7 *Impact indicators*

One respondent (1.3%) had made one or two formal complaints about the low altitude flights. However, 22 respondents (23.2%) reported informal complaints to friends or family. Five of these had complained more than once a month, 5 had complained between once a month and three times a year, and 12 had complained three times a year or less. Also, 17.5% of the local officials and newspapers had received complaints about the flights.

Opposition or strong opposition to the flights were reported by 19 respondents (23.8%) beneath SR-771, while 25 (31.3%) respondents supported or strongly supported these activities. A plurality of respondents (36, or 45%) neither opposed nor supported the flights.

D.3 NOISE

D.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP the L_{dnmr} for SR-771 is 50.5 dB at centerline and 50.4 dB at 3 miles from centerline (Fig. D.3.1). Beneath the area where SR-771 enters R-6901 the L_{dnmr} at centerline is 54.6 dB, and 54.3 dB 3 miles from centerline, but these noise levels do not include helicopter activity in R-6901. In both cases, the calculated noise levels are a little higher than the ambient noise level.

The maximum SEL tor SR-771 is 99.8 dB at centerline and 57.2 dB 3 miles from centerline. Beneath the area where SR-771 and R-6901 are concurrent, the maximum SEL is 108.2 dB at centerline and 65.6 dB 3 miles from centerline.

D.3.2 Impact Assessment

The primary use of SR-771 is C-130 aircraft flying about 1 sortie per day. This level of airspace use results in a 50 dB L_{dnmr}. In addition to SR-771, concurrent use extends to noise generation by helicopters as well as fixed wing aircraft. ROUTEMAP is not presently equipped to evaluate the contributions of helicopters to L_{dnmr}, consequently only contributions from the fixed wing aircraft are included in the L_{dnmr} calculations. On that basis, a level of 55 dB is calculated. At this level only a small percentage of people (2 to 3%) are expected to be highly annoyed. No added risk to persons susceptible to hypertension is anticipated at this low level of noise exposure. Again, the noise level calculated does not include contributions from the daily helicopter use of the airspace. The human health impacts are negligible.

D.4 AMERICAN INDIANS

No sovereign American Indian groups are located under or near SR-771 (Fig. D.4.1).

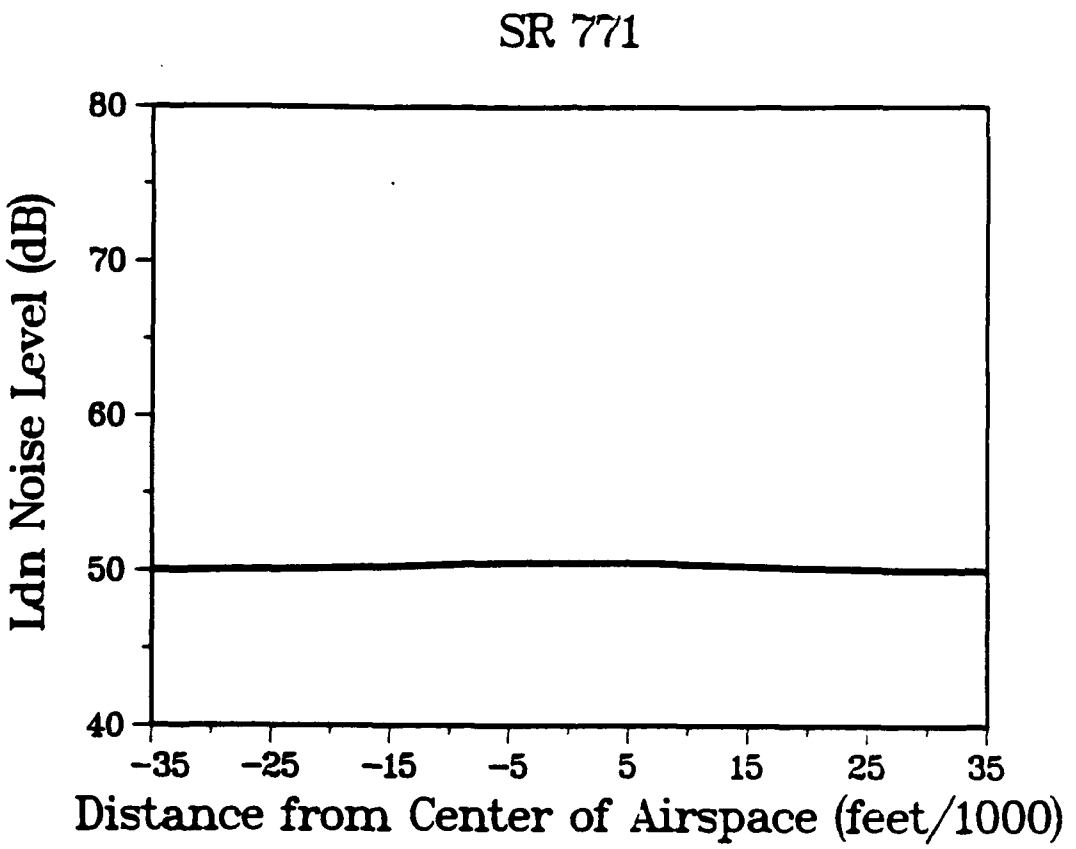
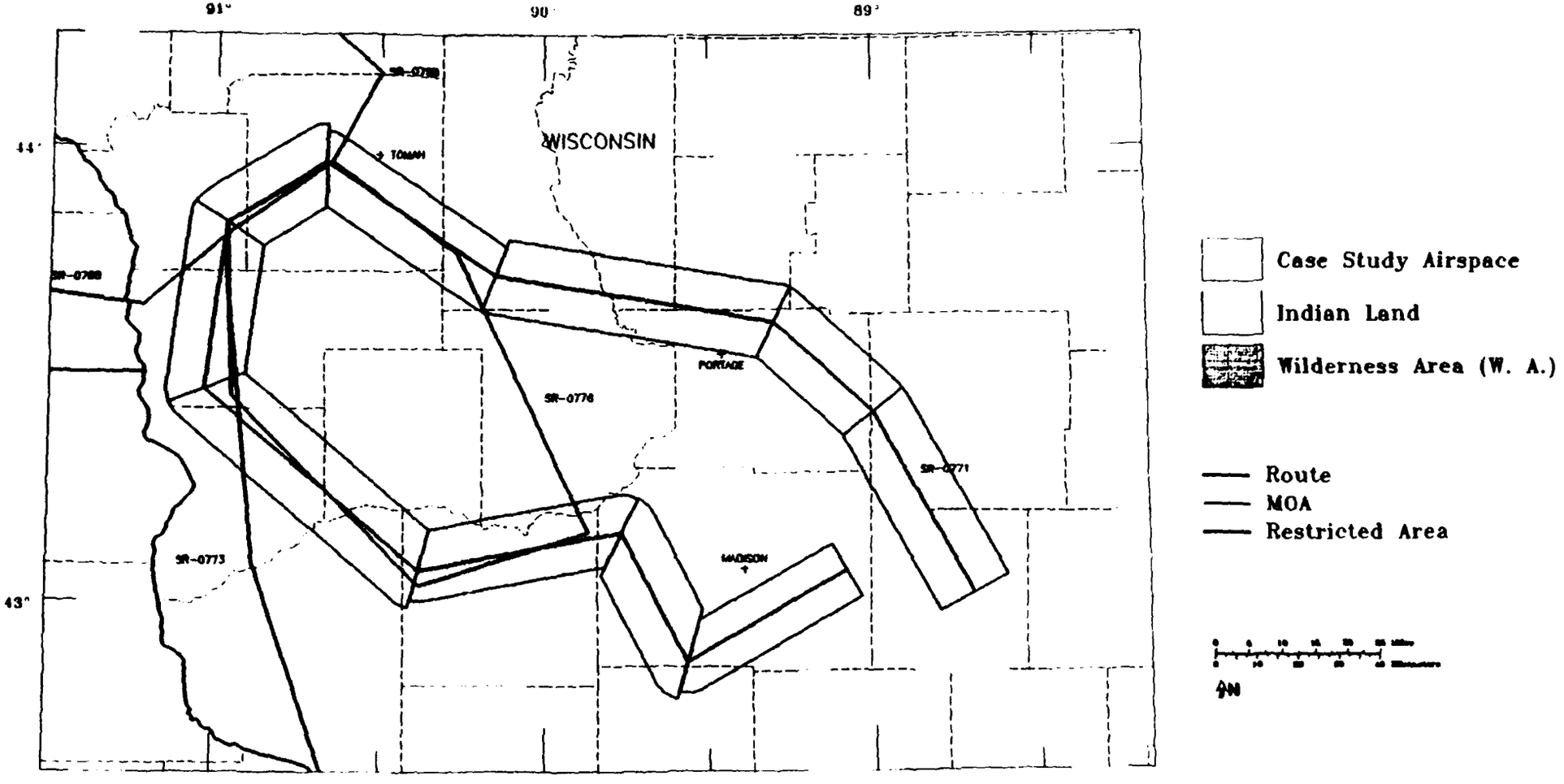


Fig. D.3.1. L_{dnmr} levels for SR-771.

Fig. D.4.1 Federally protected areas in the SR-771 region.



D.5 STRUCTURES

D.5.1 Resource Description

Typical structures under SR-771 include one and two story frame buildings; one and two story brick and stone buildings; mobile homes; frame barns and outbuildings; and prefabricated metal buildings. The building stock is typical of that found in rural, agricultural areas of the Great Lakes states.

D.5.2 Impact Assessment

SR-771 is used primarily by smaller aircraft and slower cargo aircraft. These have been shown to contribute negligibly to structural damage. Based on GEIS findings (Appendix E), it is unlikely that any noticeable damage beyond normal aging to typical structures in the area, including cracked walls or foundations or broken windows, could be expected to result from the Air Force's current low altitude flying operations.

D.6 WILDERNESS AND PARKS

No national parks or wilderness areas are located under or near SR-771 (Fig. D.4.1).

D.7 WILDLIFE

D.7.1 Resource Description

SR-771 is located mostly in a transition life zone that has few characteristic plant or animal species in comparison to life zones to the north and south (Jackson 1961). The Wisconsin River Valley, which bisects the area traversed by SR-771, supports elm-ash-

cottonwood forests having many species characteristic of the life zone to the north (Eyre 1980; Jackson 1961). Oak-hickory forests are present in many areas north of the Wisconsin River, whereas cleared land predominates to the south (Eyre 1980).

SR-771 intersects migration corridors for waterfowl, including tundra swans, Canada geese, American wigeon, blue-winged teal, canvasback, redhead, ring-necked duck, and lesser scaup (Bellrose 1976). Between Black Earth and Retreat (Points C-D-E on SR-771), wild turkey populations have increased considerably since 1980 due to natural population growth and stocking by the Wisconsin Department of Natural Resources (Druckenmiller 1987). An area where SR-771 crosses the Wisconsin River near Muscoda (NW of Point D on SR-771), which is just within the outer boundary of the route, is the site of an experimental program to re-establish the peregrine falcon, an endangered species. Because of the abundance of fish, the Wisconsin River is used extensively by bald eagles during migration and winter and by ospreys during migration (Druckenmiller 1987).

The bald eagle (T) and American peregrine falcon (E) are the only federally listed species for the area lying under the route.

D.7.2 Impact Assessment

SR-771 in Wisconsin intersects areas in Wisconsin frequented by many species of migrating waterfowl, an area inhabited by an expanding population of wild turkeys, the Wisconsin River where migrating ospreys and wintering bald eagles occur, and a site on the Wisconsin River where an attempt is being made to reestablish peregrine falcons.

The Wisconsin Department of Natural Resources (DNR) expressed several concerns (Druckenmiller 1987). Low altitude aircraft flights could cause abnormal movements and

behavioral disturbances of wild turkeys. Concern was also expressed for possible impacts on eagles, ospreys, and falcons. The DNR suggested that turkey and raptor monitoring programs be conducted to determine mitigation needs. In view of these concerns, impacts are classified as low to moderate for both endangered species and other wildlife.

D.8 LIVESTOCK AND POULTRY

D.8.1 Resource Description

The southern half of Wisconsin includes the principle agricultural areas of the state (total of 71 Wisconsin counties), and SR-771 intersects 17 counties in this area. Grant, Dane, and Dodge are three counties that lie under SR-771 and rank high in milk production and in cattle and calves (Table D.8.1). Other leading counties in these commodities are Green, Columbia, and Iowa. Milk production and dairy products in Wisconsin rank first among all the states and account for over 55% of the state's total agricultural cash receipts. SR-771 is also located in five of the top six counties in egg production, a commodity that accounts for only 0.7% of the state's agricultural cash receipts. Wisconsin ranks first among the states in mink production and produces nearly twice as many mink as any other state (USDA 1988).

D.8.2 Impact Assessment

SR-771 in Wisconsin is located in high production areas for milk products, cattle, hogs, sheep, eggs, and mink. Potential impact of low altitude flight on all of these animal commodities is a concern of the Wisconsin Department of Agriculture, Trade and Consumer Protection, which called attention specifically to impacts of piling and suffocation of confined turkeys and chickens, mink killing their young, and injuries occurring when cattle and other animals are frightened. The Department cited instances

Table D.8.1. Livestock and poultry rankings for SR-771 in Wisconsin: National and state rankings and leading counties[a]

Commodity	Rank N	Rank S	Leading counties
Dairy products	1	57	Marathon, Clark, Grant, Dane, Dodge, Fond du Lac, Chippewa
Meat animals			Grant, Dane, Dodge, Columbia, Lafayette, Green, Marathon
Cattle and calves	8	12	Grant, Dane, Marathon, Clark, Dodge, Fond du Lac, Chippewa
Hogs and pigs	12	4.7	Grant (far above others), Dane, Lafayette, Green, Columbia
Sheep and lambs	NR	0.07	Dane, Columbia, Grant, Portage, Rock, Iowa, Pierce
Miscellaneous livestock	NR	0.2	
Poultry and eggs			Barron (far above others), Racine, Trempealeau, Jefferson
Broilers	NR	0.3	
Eggs	NR	0.7	Jefferson, Walworth, Sauk, Dane, Iowa, Columbia
Turkeys	10	1.3	
Miscellaneous poultry	NR	0.5	
Mink pelts	1	0.8	
Honey	NR	0.04	

[a]Explanation: National rank (N) is State's place among all U.S. States; Sate rank (S) is the percentage of the cash receipts for all plant and animal agricultural commodities; NR = not reported; Leading counties are listed in order from highest to lower value of the commodity; Underlined counties underlie the low altitude flight route.

Source: WASS (1988).

when low flying aircraft were believed to have caused cows to stampede resulting in laceration and traumatization of cow udders. Similar reports indicated piling of turkeys may have occurred. Surveys of local officials and military bases also indicated that complaints were such that the impact to livestock and poultry could be significant (Sect. D.2.2). That Wisconsin ranks first among the states in dairy products and mink production indicates the relatively high potential for economic consequences. Hence, impacts are classified as low both livestock and poultry for this route.

D.9 AIR QUALITY

D.9.1 Resource Description

Air quality in counties beneath SR-/71 is generally good, except that a portion of Dane County, within the City of Madison, is designated by EPA as non-attainment with respect to the primary NAAQS for SO_2 and the recently-superseded secondary NAAQS for TSP (EPA 1989). SR-771 does not cross over the City of Madison. There are no PSD Class I areas within 6 miles of the SR-771 corridor.

D.9.2 Impact Assessment

The air quality impact analysis for SR-771 indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be far below levels of concern for areas under the route. The maximum predicted incremental concentrations for SR-771 were less than 5% of the NAAQS and PSD Class II increments, which are applicable in the areas overflown by this route. These impacts are considered to be negligible (Table 4.1.9).

E. VR-162 (TEXAS, OKLAHOMA)

E.1 AIRSPACE

VFR Route 162 (VR-162), established on January 12, 1972, is an Air Training Command route in the south central United States scheduled by the 80th Flying Training Wing at Sheppard AFB, Texas (Fig. E.1.1). The MTR begins in north central Texas, proceeds northward across the southwest corner of Oklahoma, reenters Texas over Collingsworth County and circles southward to its destination near the route's beginning point. VR-162 covers 10 counties in Texas and 3 in Oklahoma.

The area beneath VR-162 is part of the Central Lowlands region of the United States. The terrain is best described as irregular plains—generally very flat with only slight relief. Land uses include small farms and oil drilling operations which leave an abundance of open space. Although there are some wooded areas, visibility from the ground is generally good due to the level terrain.

VR-162 was developed to provide training for ATC student pilots at low altitudes between 500 ft AGL and 5000 ft MSL. The route's width is 11.5 statute miles along a distance of 266.9 miles, covering an area of 2,981 sq. miles VR-162 is available for scheduling from sunrise to sunset, 5 days a week. ATC does not conduct weekend operations on VR-162.

Although VR-162 is available to the Air Force for scheduling from sunrise to sunset, 5 days a week, ATC typically schedules and uses the route only during the day on Fridays. The route is currently used by the 80th FTW to train new Air Force and NATO pilots in basic flying skills. In an average month in 1986, the 80th FTW

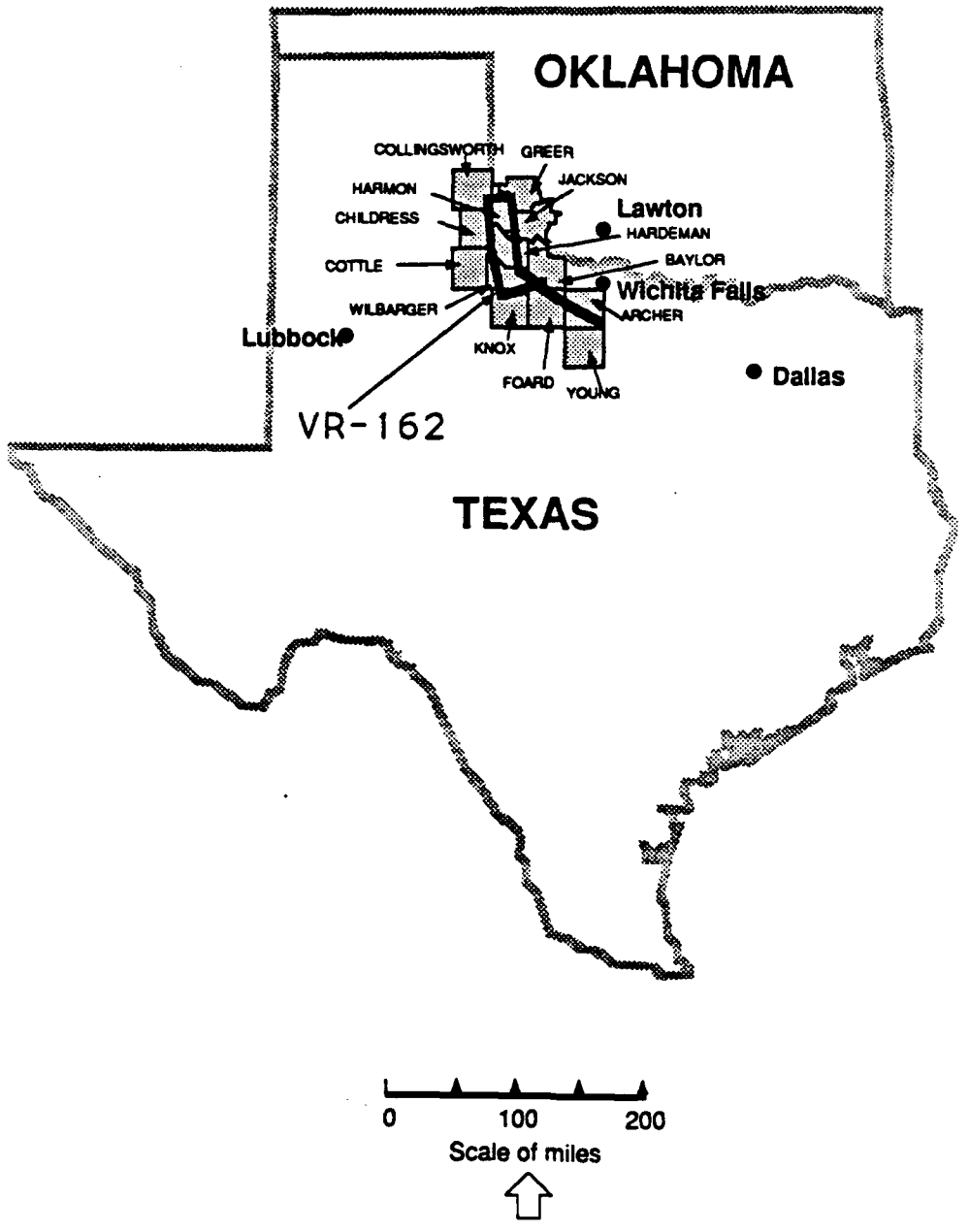


Fig. E.1.1. Map of VR-162.

scheduled about 70 T-38 sorties, typically at altitudes of 1,000 ft AGL (with a minimum of 500 ft AGL) and at speeds of about 410 mph.

At least ten MTRs cross or are concurrent with VR-162. The busiest of these is VR-1138, another ATC route from Sheppard AFB, with 111 sorties scheduled for the T-38 in the average month in 1986. Typical altitudes and speeds are the same as for VR-162.

E.2 SOCIAL

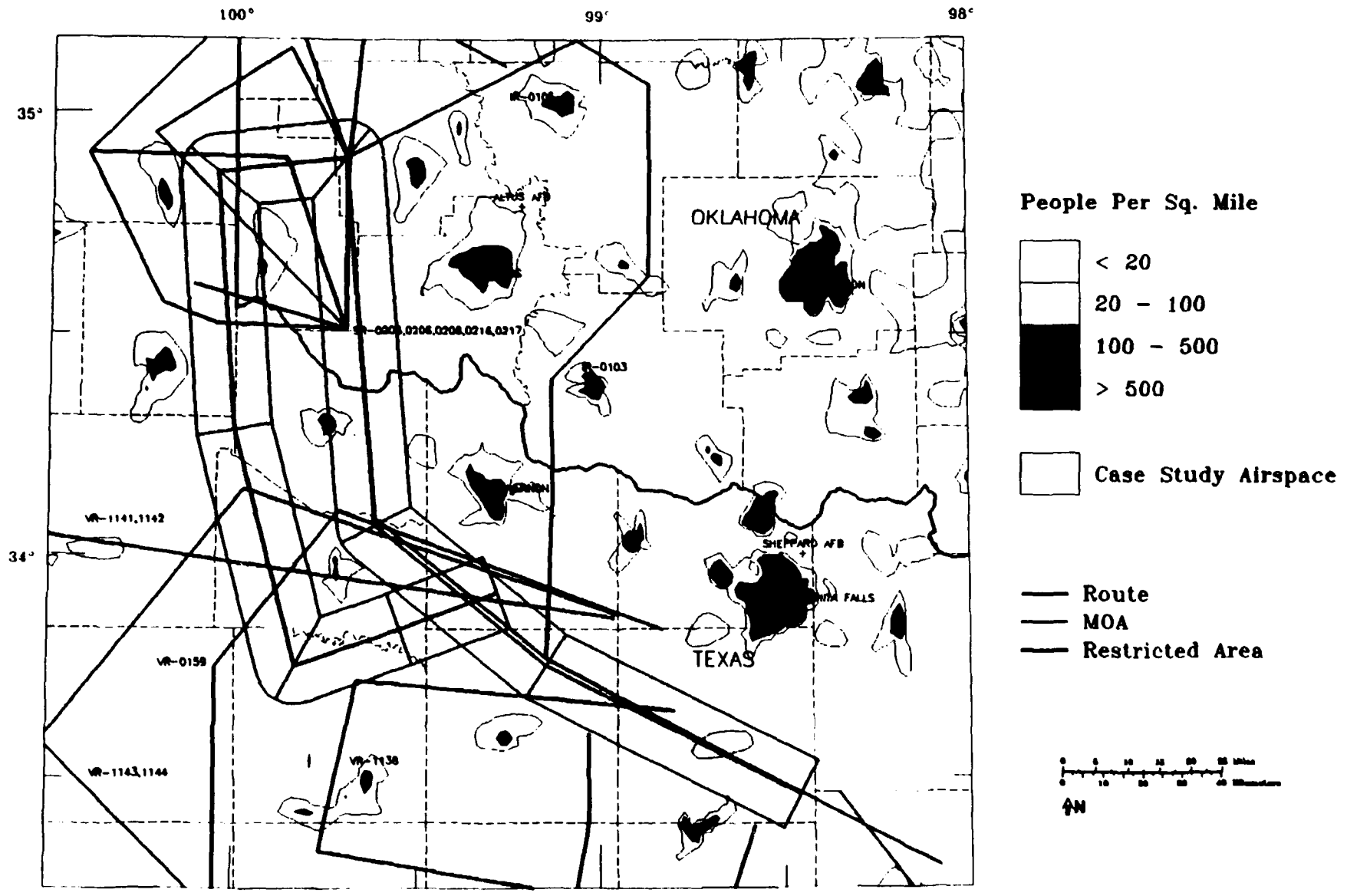
E.2.1 Resource Description

Approximately 10,000 people lived beneath VR-162 in 1980; the average population density was approximately 3.2 persons/sq. miles. In comparison, the average 1980 population density for Texas was 54.3 people/sq. miles and for Oklahoma 44.1 people/sq. miles, while U.S. population density was 64.0 people/sq. miles. Figure E.2.2 depicts population distribution under VR-162. There are 12 small towns beneath VR-162 in Texas, the largest being Quanah (population 3,890) and Archer City (1,862). There are also 4 small towns beneath VR-162 in Oklahoma, and the largest is Eldorado (688).

E.2.2 Impact Assessment

A total of 56 face-to-face interviews were conducted with people living or working under VR-162. In addition, 37 key informant interviews were conducted with local government officials and newspaper editors. Analyses indicate that the impacts of low altitude flights are moderate under VR-162. Activity interruption is a moderate impact. However, annoyance, community disruption, and reported economic losses from

Fig. E.2.2 Population distribution in the VR-162 region.



disrupted livestock productivity are low. No key informants reported disruption of young children in group facilities.

E.2.2.1 *Awareness*

A majority of people interviewed face-to-face (48, or 87.3%) or by telephone (32, or 86%) were aware of low altitude military flights in the vicinity. Face-to-face interviews were conducted with people who live or work beneath VR-162 and telephone interviews were conducted with local government officials and newspaper editors.

E.2.2.2 *Annoyance*

Of the respondents beneath VR-162, 11 (20%) were highly annoyed with at least one aspect of Air Force low altitude flights—a low impact. Seven (13.2%) were highly annoyed by the possibility of an aircraft accident, 5 (9.1%) by aircraft noise, 4 (7.3) by the altitude of the flights, and 3 (5.5%) by the presence of the flights.

Most respondents (36, or 65.5%) reported low annoyance with the flights on all four annoyance variables. Fifty-one (92.7%) reported low annoyance with the presence of the flights, 45 (81.8%) with the altitude, 42 (79.2%) with the possibility of an aircraft accident, and 40 (72.7%) with the aircraft noise.

E.2.2.3 *Interrupted activities*

Activity disruption is the most severe social impact under VR-162, constituting a moderate impact. Eight of the 56 respondents (14.5%) beneath VR-162 reported sleep interruption or interruption of three or more non-sleep activities during the previous month. Three respondents (5.6%) reported sleep disruption. Three respondents also

reported the interruption of three, two respondents (3.6%) reported the interruption of four, and one (1.8%) reported the interruption of five non-sleep activities. No one reported the interruption of more than five non-sleep activities. On the other end of the scale, most respondents (38, or 69.1%) reported no interruption of non-sleep activities, 10 (18.2%) reported the disruption of one non-sleep activity, and one (1.8%) reported the interruption of two such activities.

E.2.2.4 *Community disruption*

One (2.7%) of the local officials and newspaper editors interviewed as representatives of the area beneath VR-162 was aware of community disruption resulting from the low altitude flights, indicating a low impact.

E.2.2.5 *Disturbance of young in group facilities*

None of the local officials and newspaper editors had received complaints regarding the disturbance of the very young in group facilities beneath VR-162. This indicates a negligible impact. In addition, one survey respondent indicated that flights are bothersome because they disrupt children.

E.2.2.6 *Reduced livestock productivity*

Impacts of flights on livestock productivity are low. Three (8.1%) of the local officials and newspaper editors were aware of reported losses in productivity from commercial livestock operations beneath VR-162. Disruption of domestic animals was described as a negative aspect of low altitude flights in one face-to-face interview.

E.2.2.7 *Impact indicators*

Two respondents (5.6%) previously had made one or two formal complaints about the flights. Ten respondents (21.2%) reported informal complaints to friends or family. One of these had complained more than once a month, four had complained between once a month and three times a year, and five had complained three times a year or less. In addition, 13.5% of the local officials and newspapers had received complaints about the flights.

Overall, relatively few respondents opposed the low altitude flights. While three respondents (6.4%) beneath VR-162 either were opposed or strongly opposed to the flights, 23 (48.9%) neither opposed nor supported the flights, and 21 (44.7%) either supported or strongly supported them.

E.3 NOISE

E.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP, the L_{dnmr} for VR-162 is 50.2 dB at centerline and 50.1 dB at 3 miles from centerline (Fig. E.3.1). Beneath the area where VR-162 crosses VR-1138, the L_{dnmr} at centerline is 53.3 dB, and 53.2 dB 3 miles from centerline. Thus, the calculated noise levels in both situations are similar to the ambient noise level.

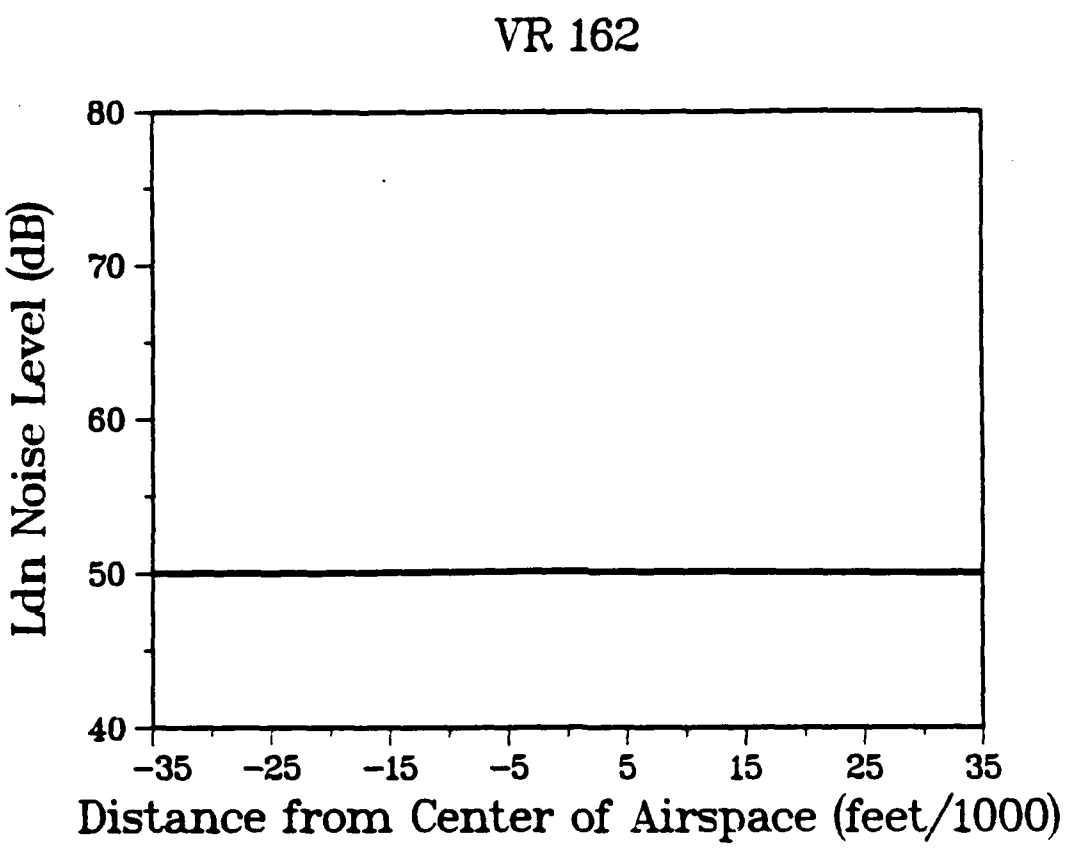


Fig. E.3.1. L_{dnmr} levels for VR-162.

The maximum SEL for VR-162 is 95.3 dB at centerline and 52.7 dB 3 miles from centerline. Beneath the area where VR-162 and VR-1138 are concurrent, the maximum SEL is also 95.3 dB at centerline and 52.7 dB 3 miles from centerline.

E.3.2 Impact Assessment

Operation of the T-38 training aircraft, the principle user of VR-162, has little effect on the ambient noise level. The calculated noise level of 50 dB L_{dnmr} may result in high annoyance of 0 to 2% of the people overflown and, therefore, no impacts on human health are expected to result from operation of VR-162. Concurrent use of this airspace mostly consists of additional T-38 aircraft. In the area of highest concurrent use, the noise level increases to 53 dB L_{dnmr}. At this level about 2 to 3% of the people overflown may be highly annoyed. These levels are well below the noise levels which are considered sufficient to add a stress risk to hypertension prone individuals. The impact level for human heath for this airspace is negligible.

E.4 AMERICAN INDIANS

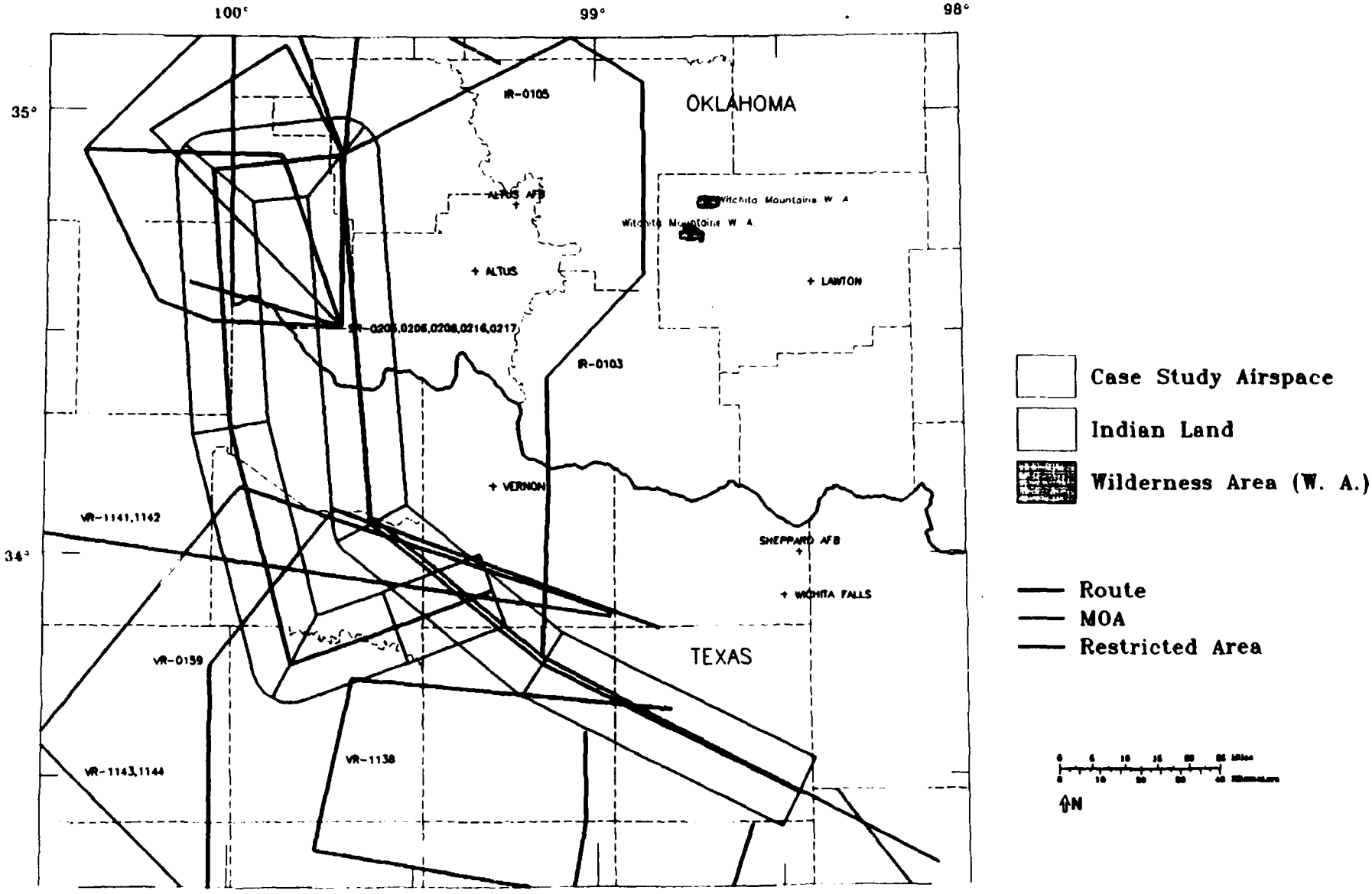
No sovereign American Indian groups are located under or near VR-162 (Fig. E.4.1).

E.5 STRUCTURES

E.5.1 Resource Description

Typical structures under VR-162 include one and two story frame buildings; one and two story brick buildings; mobile homes; frame barns, outbuildings, and water towers; and prefabricated metal buildings. The building stock is typical of the semi-arid south-central states.

Fig. E.4.1 Federally protected areas in the VR-162 region.



E.5.2 Impact Assessment

The high altitude (1,000 ft AGL) in addition to the diminutive nature of the training aircraft noise levels precludes any effects on any structure beyond normal aging.

E.6 WILDERNESS AND PARKS

No national parks or wilderness areas are located under or in the vicinity of VR-162.

E.7 WILDLIFE

E.7.1 Resource Description

VR-162 is located over the rolling plains region of Texas and southwestern Oklahoma. The region has been largely converted from native grasslands to cattle raising and the growing of wheat, grain sorghums, and cotton. Native vegetation is alternating mesquite woodland and prairie in about equal proportions. Native grasses include big, little, sand and silver bluestems, wintergrass, switchgrass, sideoats and blue gramas, wildryes and bunchgrasses (Tharp 1952); woody plants, in addition to mesquite, include juniper, shinnery, blackjack, post and live oaks, and sand sagebrush.

Birds are not common except near streams, ponds, and lakes or reservoirs, where killdeer, other plovers, and water birds sometimes congregate (Oberholser 1974). Characteristic summer species include Mississippi kite, burrowing owl, common nighthawk, horned lark, and meadowlark. Various ducks (e.g. pintail, mallard, teals, and redhead) and geese (e.g., snow and Canada) are associated with freshwater reservoirs, primarily on the Red River and its tributaries. Migration corridors for several hundred

thousand waterfowl bisect the area, including those for white-fronted and Canada geese, gadwall, teal, shoveler, and lesser scaup (Bellrose 1976). Other waterfowl include egrets and herons. Significant reservoirs occur in Archer, Baylor, Wilbarger, Hardeman, and Childress Counties of Texas, and in Greer Co. Oklahoma. Raptors include marsh, sparrow, redtailed, Coopers and Swainson's hawks, and game animals include pronghorn antelope and white-tailed deer, scaled and bobwhite quail, wild turkey, mourning dove, rabbit and squirrel (Chapman and Feldhamer 1982; Davis 195y).

Potentially occurring federally listed endangered and threatened species are grizzly bear (T), ocelot (E), black-footed ferret (E), red wolf (E), whooping crane (E), and American peregrine falcon (E). However, the four listed mammals are unlikely to occur there.

E.7.2 Impact Assessment

Wild turkey and reintroduced mule deer in Oklahoma occur north of the route and are unlikely to be frightened seriously by low altitude flights, particularly because of the 500 ft AGL minimum altitude. Raptors, especially Swainson's and ferruginous hawks (Category 2 species for consideration as endangered or threatened) in Oklahoma, may occasionally be frightened, and nest abandonment or other effects on breeding are possible but not probable given the minimum altitude. Occasional collisions and some frightening of waterfowl on the Red River and at Lakes Kemp and Kickapoo in Texas are also possible but are not expected to produce adverse effects on populations.

Officials in the two states have noted these concerns (Lewis 1987; Travis 1987). However, impacts for both endangered species and other wildlife are classified as low and not significant because they are of low intensity, probability, and frequency and are not affecting numerous or seriously endangered species.

E.8 LIVESTOCK AND POULTRY

E.8.1 Resource Description

Route VR-162 is located over agricultural and cattle-raising areas of the Texas Panhandle. Texas ranks (USDA 1987) within the top ten states for most measures of livestock and poultry production except for hogs, where it ranks sixteenth, and turkeys for which it is not listed. No mink are reported for any Texas counties. Compared with other Texas counties, the counties under VR-162 rank in the lower half (between 150 and 200 out of 254 counties) on livestock and poultry production. Archer, Wilbarger, and Young counties rank near 100 within the state for cattle and chickens; Archer and Young are similarly ranked for turkeys (ORNL 1989).

Although Oklahoma ranks fourth among the states for cattle, it ranks in the middle for most other measures of livestock and poultry production; it is not ranked for turkey production and no mink are reported for any counties. Most of the livestock and poultry activity occurs in the panhandle and eastern part of the state, however. For the three counties under VR-162, the rankings within the state are near the bottom for all measures (ORNL 1989).

E.8.2 Impact Assessment

Portions of the area in the Texas Panhandle exhibit considerable livestock and poultry activity, particularly in Archer, Wilbarger, and Young counties. Low altitude flights could frighten animals and on occasion cause mortality or property damage. On this basis impacts are considered to be low for both livestock and poultry. State agricultural

officials in Texas have expressed no concerns, and in Oklahoma only limited concern was indicated for frightening of animals and poultry.

E.9 AIR QUALITY

E.9.1 Resource Description

There are no designated NAAQS non-attainment areas in the region of northern Texas and southern Oklahoma overflown by VR-162 (EPA 1989). Also, there are no PSD Class I air quality areas within 6 miles of the VR-162 corridor.

E.9.2 Impact Assessment

The air quality impact analysis for VR-162 indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be far below levels of concern for the areas overflown. The maximum predicted incremental concentrations for VR-162 were less than 5% of the NAAQS and PSD Class II increments, which are applicable in the areas overflown by this route. These impact levels are considered to be negligible (Table 4.1.9).

F. VR-1679 (ILLINOIS, INDIANA)

F.1 AIRSPACE

VFR Route 1679 (VR-1679), established on April 1, 1983, is an Air National Guard training route in the central United States scheduled by the 181st Tactical Fighter Group at Hulman Regional Airport in Terre Haute, Indiana (Fig. F.1.1). The MTR begins just across the Illinois border from Terre Haute, circles in a counter-clockwise direction to the southeastern portion of Illinois, reenters Indiana north of Evansville and proceeds northward ending near Camp Atterbury in Indiana. VR-1679 passes over 18 counties in Indiana, 10 in Illinois and 2 in Kentucky.

The area beneath VR-1679 is in the Central Lowlands region of the United States with the terrain best described as irregular plains. The topography is a bit steeper on the eastern portion of the route (Indiana) than on the western part (Illinois), which is very level. The landscape generally consists of open farmland with good visibility, especially as one travels westward. Wooded areas are common, however, and can restrict visibility despite the level terrain.

VR-1679 was developed to provide training for ANG aircrews at altitudes between 500 ft and 1,500 ft AGL. The route's width varies from 10.3 to 16.1 statute miles along a distance of 301 statue miles covering an area of 3,762 sq. miles VR-1679 is available for scheduling from sunrise to sunset every day except Monday.

Although VR-1679 is available from sunrise to sunset, 6 days a week (the airspace is not available on Mondays), the Air National Guard generally schedules and uses the route about 1 hr daily. In an average month in 1986, the sorties scheduled on VR-1679 were as follows:

Fig. F.1.1. Map of VR-1679.

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
F-4E	48	500	480
A-7	4	500	480
Total	52		

Generally, these aircraft fly 70% of the sorties within 2 nautical miles of the route centerline, and 95% within 4 nautical miles.

There are ten MTRs and two RAs which cross or are concurrent with VR-1679. The busiest of these is VR-1631, an ANG route scheduled by the 121st Tactical Fighter Wing at Rickenbacker ANGB in Ohio, with the following scheduled usage in an average month in 1986:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
A-7	178	500	480
F-4D	29	500	480
Total	207		

Typically, these aircraft fly in the middle portion of the route.

F.2 SOCIAL

F.2.1 Resource Description

Approximately 113,000 people lived beneath VR-1679 in 1980; the average population density was approximately 29.9 persons/sq. miles. In comparison, the 1980 population density of Indiana was 152.8 people/sq. miles and Illinois 205.4 people/sq. miles, while the U.S. population density was 64.0 people/sq. miles. Figure F.2.2 portrays population distribution under VR-1679. There are 38 small towns beneath VR-1679 in Indiana, the largest being Petersburg (population 2,987), Winslow (1,017) and Milltown (1,006). There are also 25 towns beneath VR-1679 in Illinois and the largest are Mt. Carmel (8,908), Albion (2,285) and Louisville (1,166).

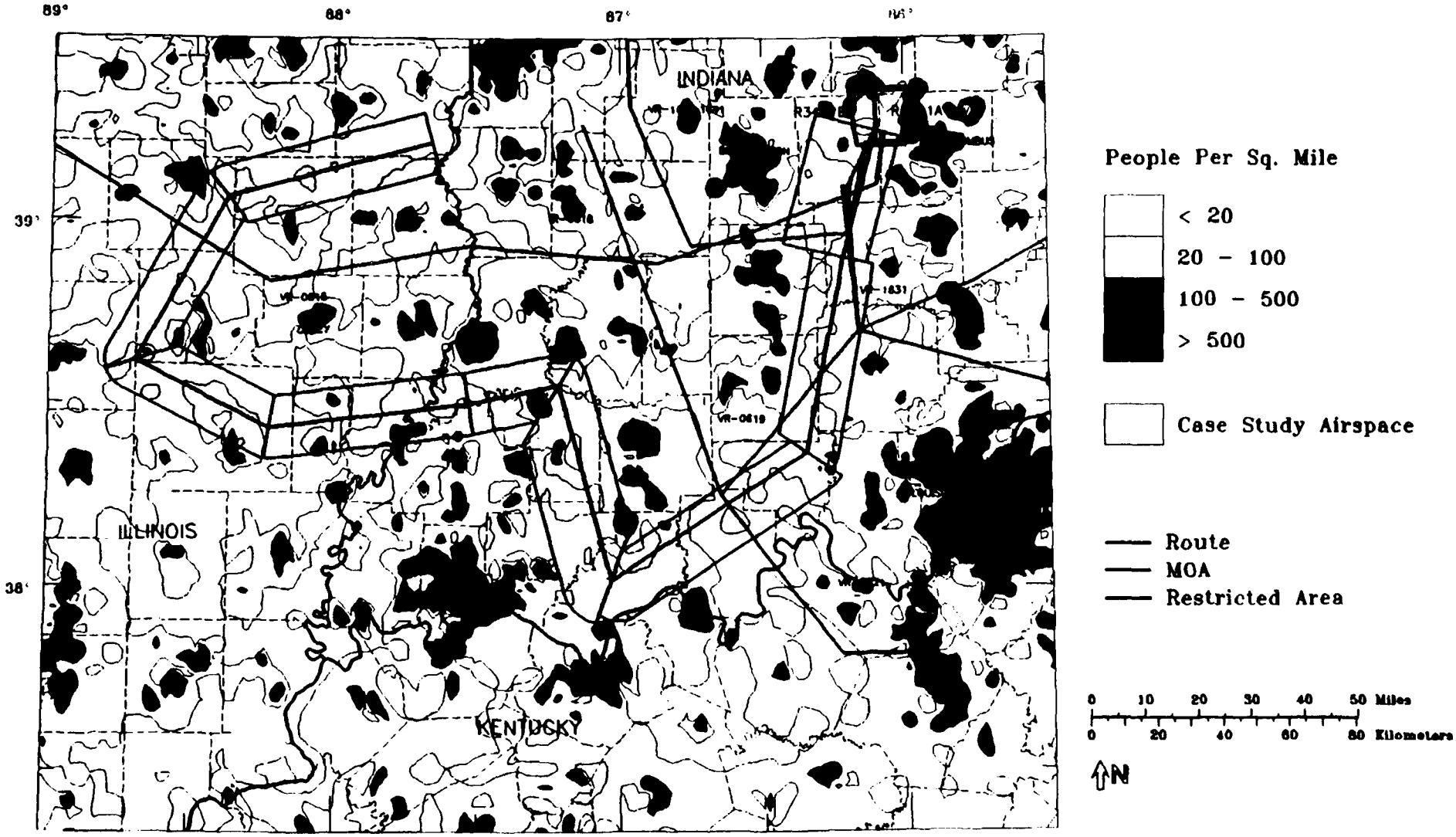
F.2.2 Impact Assessment

Based on analyses of data gathered from 115 face-to-face interviews and 96 telephone interviews, the social impacts of low altitude flights under VR-1679 are moderate. Both annoyance and interrupted activity impact levels are moderate. Impacts are low for community disruption, disturbance of young children in group facilities, and reported economic losses from livestock disruption.

F.2.2.1 *Awareness*

A higher percentage of survey respondents were aware of low altitude military flights in the vicinity than were key informants. While 86% (98) of the respondents were aware of flights, 77% (74) of the local government officials and newspaper contacted were aware of flights in the area.

Fig. F.2.2 Population distribution in the VR-1679 region.



F.2.2.2 *Annoyance*

Forty-five respondents (39.8%) were highly annoyed with at least one aspect of the low altitude flights—a moderate impact. Approximately one-quarter of the respondents were highly annoyed by aircraft noise (30, or 26.5%) the altitude of flights (28, or 24.8%), and the possibility of an aircraft accident (27, or 25%). Fewer respondents (13, or 11.6%) were highly annoyed by the presence of the flights.

Conversely, 48 respondents (42.5%) reported low annoyance with the flights on all four annoyance variables. Eighty-six (76.8%) reported low annoyance with the presence of the flights, 74 (68.5%) with the possibility of an aircraft accident, 71 (62.8%) with the altitude, and 61 (54%) with the aircraft noise.

F.2.2.3 *Interrupted activities*

Flights created a moderate impact with regard to interrupted activities. Twenty-three respondents (20.2%) beneath VR-1679 reported sleep interruption or interruption of three or more non-sleep activities during the previous month. Seven respondents (6.2%) reported sleep disruption. Three respondents (2.6%) reported the interruption of three, 7 respondents (6.1%) reported the interruption of four, 8 (7.0%) reported the interruption of five, and 3 (2.6%) reported the interruption of six non-sleep activities. On the other end of the scale, 69 (60.5%) respondents reported no interruption of non-sleep activities, 14 (12.3%) reported the disruption of one non-sleep activity, and 10 (8.8%) reported the interruption of two such activities.

F.2.2.4 *Community disruption*

One (1.1%) of the local officials and newspaper editors was aware of community disruption resulting from the flights, indicating a low impact level.

F.2.2.5 *Disturbance of young in group facilities*

One (1.1%) of the local officials and newspaper editors had received complaints regarding the disturbance of the very young in group facilities beneath VR-1679. This indicates a low impact level. However, during face-to-face interviews, 9 respondents said that disruption of children was something they dislike about low altitude flights.

F.2.2.6 *Reduced livestock productivity*

Two (2.1%) of the local officials and newspaper editors were aware of reported losses in productivity from commercial livestock operations beneath VR-1679. Impacts in this area apparently are low. In addition 3 respondents indicated that flights disrupt livestock.

F.2.2.7 *Impact indicators*

None of the respondents surveyed beneath VR-1679 had made formal complaints about Air Force low altitude flying operations. Twenty-five respondents (22%) reported informal complaints to friends or family. Six of these had complained more than once a month, 6 had complained between once a month and three times a year, and 13 had complained three times a year or less. In addition, 16% of the local officials and newspapers had received complaints about the flights.

Overall, 28 respondents (28.9%) beneath VR-1679 either were opposed or strongly opposed to the flights. Thirty-six (37.1%) neither opposed nor supported the overflights, and 33 (34.0%) either supported or strongly supported these activities.

F.3 NOISE

F.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP the L_{dnmr} for VR-1679 is 52.5 dB at centerline and 52.1 dB at 3 miles from centerline (Fig. F.3.1). Thus, for VR-1679 only, the calculated noise level is a little higher than the ambient noise level. Beneath the area where VR-1679 crosses VR-1631, the L_{dnmr} is 53.1 dB at centerline and 55.6 dB 3 miles from centerline.

The maximum SEL for VR-1679 is 122.8 dB at centerline and 80.2 dB 3 miles from centerline. Beneath the area where VR-1679 and VR-1631 are concurrent, the maximum SEL is also 122.8 dB at centerline and 80.2 dB at 3 miles from centerline.

F.3.2 Impact Assessment

Operation of VR-1679 is expected to result in day-night average noise levels of approximately 53 dB. At this level a small number of persons (2 to 3%) are expected to be highly annoyed. Concurrent use of this airspace increases the noise levels to a maximum of 56 dB, at which an anticipated 3 to 9% of the population is expected to be highly annoyed. No effects on persons susceptible to hypertension are anticipated as

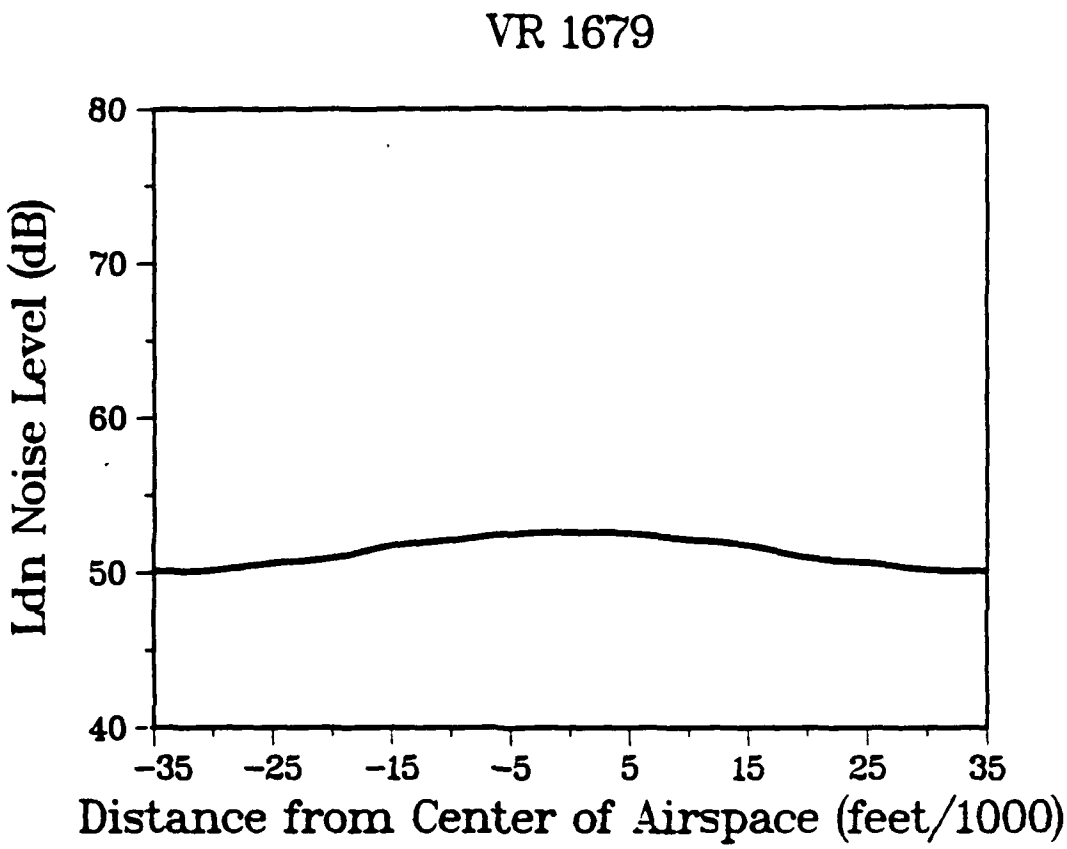


Fig. F.3.1. L_{dnmr} levels for VR-1679.

a result of these levels of noise exposure. As a consequence, the impact level for human impacts is negligible.

F.4 AMERICAN INDIANS

No sovereign American Indian groups are located under or near VR-1679 (Fig. F.4.1).

F.5 STRUCTURES

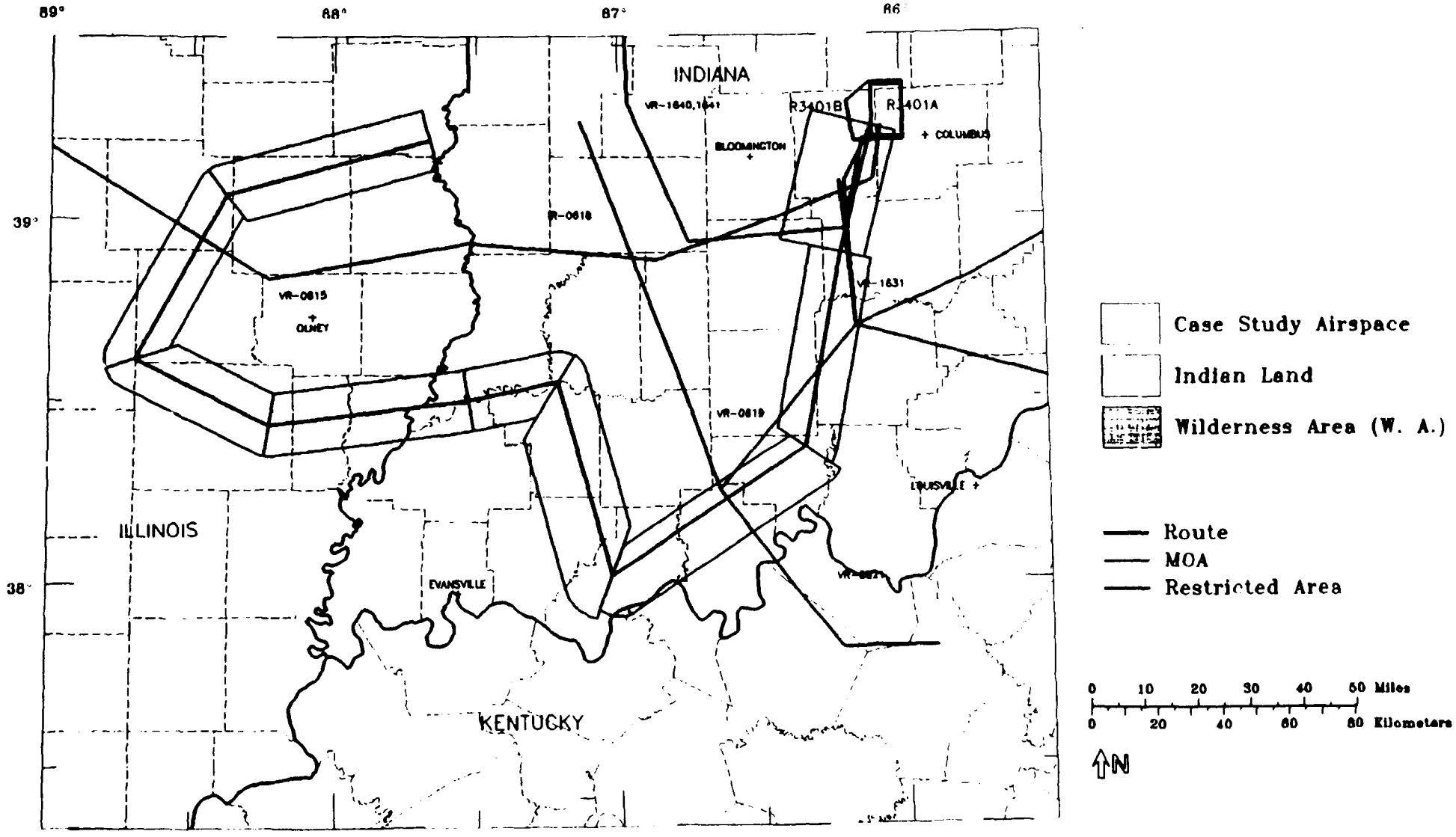
F.5.1 Resource Description

Typical structures under VR-1679 include one and two story frame buildings; one and two story stone and brick buildings; mobile homes; frame and stone barns and outbuildings; and prefabricated metal buildings. The building stock is typical of the mid-west grain belt states.

F.5.2 Impact Assessment

VR-1679 has a relatively low use factor and the aircraft are considered to be in the light category. As a result of this fact, the probability of damage beyond normal aging is negligible. Based on GEIS findings (Appendix E), it is unlikely that any noticeable damage to typical structures in the area, including cracked walls or foundations or broken windows, could be expected to result from the Air Force's current low altitude flying operations.

Fig. F.4.1 Federally protected areas in the VR-1679 region.



F.6 WILDERNESS AND PARKS

No national parks or wilderness areas are under or in the vicinity of VR-1679 in Illinois or Indiana (Fig. F.4.1).

F.7 WILDLIFE

F.7.1 Resource Description

The terrain underlying VR-1679 ranges from level in southeastern Illinois to hilly in south-central Indiana. Most of the original forest in relatively level areas has been cleared for agriculture. Remaining forest comprises oak-hickory forest in Illinois and south-central Indiana, and maple-beech-birch forest in southwestern Indiana (Eyre 1980). Elm-ash-cottonwood forests occur along Indiana's White River.

The wildlife resources of the extensive farmlands of the Illinois portion of VR-1679 are relatively limited because the cultivated fields support a low diversity of wildlife compared to the small scattered tracts of forest in the area. Wildlife is more diverse as well as more abundant in the larger forested areas in the relatively hilly country of southern Indiana.

Migration corridors used in the fall by large numbers of snow geese and Canada geese pass along the Illinois-Indiana border, which bisects the area under VR-1679 (Bellrose 1976). Other waterfowl that migrate in relatively large numbers through this area include American wigeon, mallard, black duck, blue-winged teal, ring-necked duck, and greater scaup. High populations of nesting wood ducks occur along the White River and downstream on the Wabash River to the Ohio River.

In Indiana, VR-1679 passes over the Patoka Fish and Wildlife Area near Winslow and the Little Pigeon Creek Wetland Conservation Area near Gentryville. Both areas are administered by the Indiana Department of Natural Resources (DNR) and are used by moderate numbers of spring and fall migrant birds and by a wide variety of local avian wildlife (Hansen 1987). Monroe Reservoir south of Indianapolis lies under VR-1679 just west of the route's centerline, in an area where the minimum flight altitude is 1,000 ft AGL. The reservoir is a major stopover point for migrating waterfowl and shorebirds and is the site of an annual bald eagle release/re-establishment program conducted between June 1 and October 30 by the Indiana DNR.

In addition to the bald eagle (E), federally listed species which could occur in the route area are the Indiana bat (E) and the least tern (E).

F.7.2 Impact Assessment

Wildlife resources that could be affected on VR-1679 include migrating ducks and geese (snow and Canada), nesting wood ducks along the White and Wabash rivers, and nesting bald eagles at Monroe Reservoir. The Indiana Division of Fish and Wildlife indicated concern for wildlife at the Patoka Fish and Wildlife Area and the Little Pigeon Creek Wetland Conservation Area, and for waterfowl, shorebirds, and annual release of bald eagles at Monroe Reservoir (Hansen 1987). The minimum flight altitude on VR-1679 at Monroe Reservoir is 1,000 ft AGL, which may lessen the potential impact. In Illinois, VR-1679 did not intersect any particularly important wildlife areas (Lutz 1987). Overall, impacts are classified as low for both endangered species and other wildlife on this route.

F.8 LIVESTOCK AND POULTRY

F.8.1 Resource Description

In Illinois, VR-1679 passes over 10 counties (102 counties in the state) in the state's southeastern one-quarter, an area that is not particularly important for animal commodities. Livestock industries are located primarily in the west-central and northwest parts of the state. Of the 10 Illinois counties underlying VR-1679, only Effingham county is among the leading counties for a commodity (milk cows) (Table F.8.1). Mink production in Illinois ranked 7th among all the states in 1986 and 1987 (USDA 1988). However, most Illinois mink farms are located in the northeastern corner of the state, and only a few operations are located outside of this main area (IDA 1988).

In Indiana, VR-1679 passes over 18 counties in the southwest part of the state, which has 92 counties. Several of these counties are leading counties for the production of cattle and calves, and Dubois and Jackson counties are the top two counties for chickens. The VR-1679 centerline extends for 19 miles in Jackson County but does not pass through Dubois County. Also, the total length of the centerline in Daviess, Harrison, and Lawrence counties is only 0.7 miles. Mink production in Indiana ranked 14th among all the states in 1986 and 1987 (USDA 1988).

Portions of VR-1679 lie over Daviess and Hancock counties in Kentucky, but the route centerline does not enter either one of these counties. Daviess County is primarily cropland and is ranked number one in the state for crop receipts. It is 43rd in livestock. Hancock County, which has less than a third of the amount of farmland in Daviess County, ranked 89th in the state in livestock production and 77th in crop production.

Table F.8.1. Livestock and poultry rankings for VR-1679 in Illinois and Indiana: National and state rankings and leading counties[a]

Commodity	Rank N	Rank S(%)	Leading counties
Illinois			
Livestock			Stephenson, Henry, Jo Daviess, Ogle, Carroll, Whiteside, Clinton, Pike, Adams, DeKalb
Hogs and pigs	2	15	Henry, Pike, Adams, Knox, Bureau, Ogle, Whiteside, Mercer, Warren, Stephenson
Cattle on farms	15	11	Stephenson, Jo Daviess, Ogle, Carroll, Henry, Whiteside, DeKalb, Clinton, Pike, Hancock
Beef cows	--	--	Jo Daviess, Fulton, Knox, Pike, Adams, Hancock, Mercer, Warren, Henry, McDonough
Dairy products	12	5	Stephenson, Jo Daviess, Clinton, McHenry, Washington, Boone, Effingham, Winnebago, Carroll, Ogle
Sheep on farms	21	NR	DeKalb, Henry, Ogle, LaSalle, Bureau, Woodford, Stephenson, Adams, McDonough, McLean, Macoupin
Chickens	26	0.02	NR
Eggs	NR	0.5	NR
Mink	NR	NR	McHenry, Lake, Kane
Indiana			
All cattle and calves	26	9.1	Elkhart, Kosciusko, Lagrange, Dubois, Washington, Wabash, Daviess, Lawrence, Harrison, Jackson, Marshall, Greene
Milk cows/milk	15	7.8	Elkhart, Lagrange, Marshall, Adams, Noble, Kosciusko, Daviess, La Porte, Steuben, DeKalb, Allen, Wayne
Beef cows	27	NR	NR
Sheep and lambs	26	0.1	NR
All hogs	3	20	Carroll, Clinton, Montgomery, Wabash, Rush, White, Dubois, Jasper, Decatur, Miami, Daviess, Kosciusko
Chickens	2	0.1	Dubois, Jackson, Kosciusko, Newton, White, Wabash, Pulaski, Jennings, Carroll, Adams, Lagrange, Jay
Eggs	6.2	NR	
Turkeys	7	2.4	NR

[a]Explanation: National rank (N) is State's place among all U.S. states; State rank (S) is the percentage of the cash receipts for all plant and animal agricultural commodities; NR = not reported; Leading counties are listed in order from highest to lower value of the commodity; underlined counties underlie the low altitude flight route; In Illinois, total cash receipts for livestock, chickens, and eggs were 31% of all plant and animal commodities; Illinois data for turkeys and honey were also reported but did not include rank or leading counties; Indiana data for mink and honey were also reported but did not include rank or leading counties.

Source: IDA (1988).

F.8.2 Impact Assessment

VR-1679 in Illinois avoids the regions in the state most important for livestock, poultry, and mink. Cattle have sometimes been briefly frightened by low altitude flights but have apparently not experienced any significant impacts (personal communication with Dr. Paul Doby, Illinois Division of Animal Industries, July 7, 1987). In Indiana, VR-1679 intersects areas important for cattle and chickens. Impacts are classified as low for both livestock and poultry.

F.9 AIR QUALITY

F.9.1 Resource Description

There are no designated NAAQS non-attainment areas in counties overflown by VR-1679 (EPA 1989). There are no PSD Class I areas within 6 miles of VR-1679.

F.9.2 Impact Assessment

The air quality impact analysis for VR-1679 indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be far below levels of concern for the area. The maximum predicted incremental concentrations for VR-1679 were less than 5% of the NAAQS and PSD Class II increments, which are applicable in the areas under this route. These impacts are considered to be negligible (Table 4.1.9).

G. VR-245 (ARIZONA)

G.1 AIRSPACE

VFR Route 245 (VR-245), established April 1, 1977, is a Tactical Air Command route in the southwestern part of the United States scheduled by the 832nd Air Division at Luke AFB (Fig. G.1.1). The MTR circles in a counter-clockwise pattern around Phoenix passing over five Arizona counties.

Located in the Basin and Range region, the terrain beneath VR-245 is more mountainous northeast of Phoenix and more desert-like with smaller mountains and plains as the route circles toward the Mexican border. The southwest portion of the route is very rough and desolate, with a desert environment and little civilian activity.

VR-245 was established to provide training for TAC aircrews between 500 ft AGL and 9,000 ft MSL. The route's width varies from 4 to 4.6 statute miles covering a distance of 255.6 statute miles over an area of 1,167 sq. miles VR-245 can be scheduled 24 hrs/day, 7 days/week.

VR-245 is available for Air Force use at all times. However, the Air Force generally schedules operations for about 8 hrs/day. In an average month in 1986, the aircraft sorties scheduled on VR-245 were as follows:

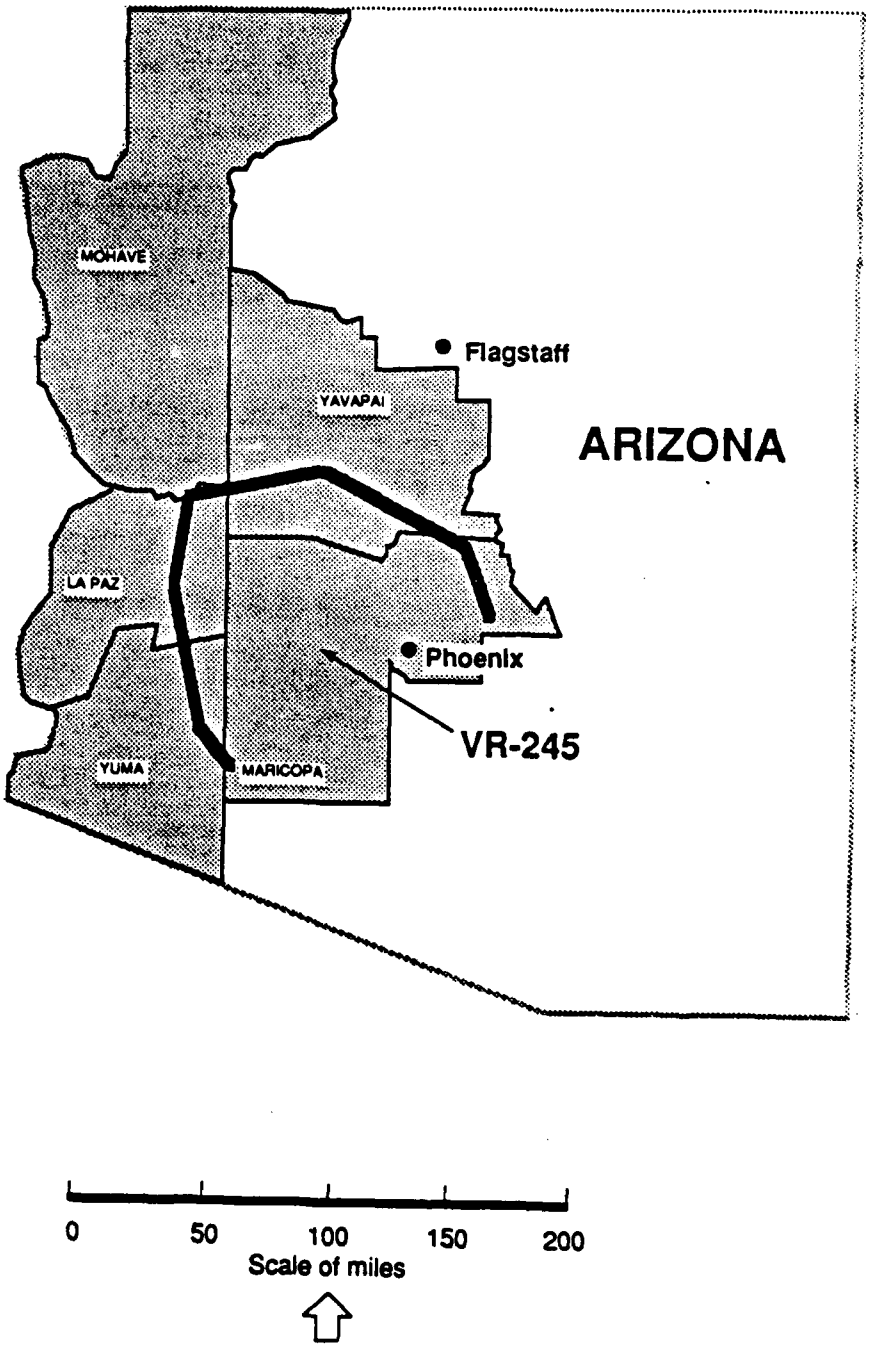


Fig. G.1.1. Map of VR-245.

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
F-16	109.2	500	520
F-5	12.5	500	470
A-7	5.9	500	480
F-4D	1.2	500	520
F-111	0.5	500	520
F-14	0.3	500	520
F-15	0.3	500	520
T-38	0.2	500	410
A-4	0.1	500	430
Total	130.2		

Generally, these fighter aircraft fly the width of the route, navigating from prominent features and practicing tactical maneuvers.

There are at least 18 MTRs, 1 MOA, and 1 RA crossing or concurrent with VR-245. The busiest of these is Restricted Area R-2301E, which is also scheduled by the 832nd AD at Luke AFB and had the following scheduled usage in an average month in 1986:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
A-10	537.2	300	340
F-15	320.5	300	520
Other	319.5	300	
F-5	245.2	300	470
A-7	234.8	300	480
A-37	167.5	300	290
C-130	17.1	300	250
F-4	0.8	300	520
F-14	0.1	300	520
Total	1842.7		

G.2 SOCIAL

G.2.1 Resource Description

Approximately 1,000 people lived beneath VR-245 in 1980; the average population density was approximately 0.8 person/sq. miles. In comparison, the population density for Arizona in 1980 was 23.9 people/sq. miles and that of the United States was 64.0 people/sq. miles. Figure G.2.2 illustrates population distribution under VR-245. There are 8 towns beneath VR-245, the largest being Crown King (population 50) and Aztec (15).

G.2.2 Impact Assessment

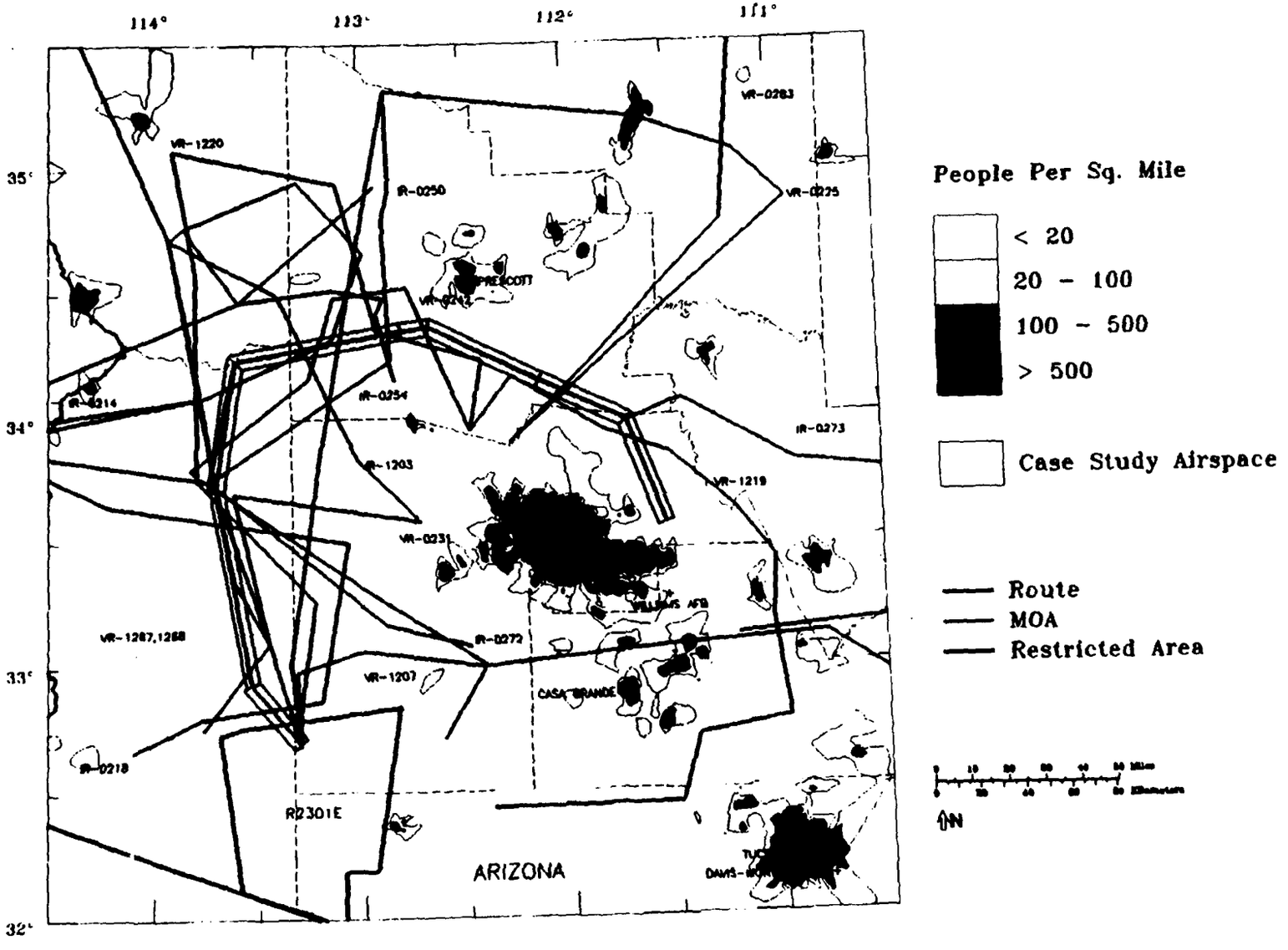
Eighteen face-to-face interviews were conducted beneath VR-245. Because interrupted activities constituted a high impact level,[7] overall the social impacts of low altitude operations under VR-245 are high. Annoyance impacts are moderate, community disruption is low, and both disruption of young children in group facilities and reported economic losses due to livestock disruption are negligible.

G.2.2.1 *Awareness*

Nearly all of the people interviewed face-to-face (17, or 94.4%) and by telephone (11, or 85%) were aware of low altitude flights in the vicinity.

[7]Overall impact levels per case study are based on the highest impact level among five impact categories.

Fig. G.2.2 Population distribution in the VR-245 region.



G.2.2.2 *Annoyance*

Seven respondents (38.9%) were highly annoyed with at least one aspect of the low altitude flights—a moderate impact. Four (22.2%) were highly annoyed by aircraft noise and by the altitude of the flights, and two (11.1%) were highly annoyed by the possibility of an aircraft accident. No one was highly annoyed by the presence of the flights.

Eight respondents (44.4%) reported low annoyance with the flights on all four annoyance variables. Fifteen (83.3%) reported low annoyance with the presence of the flights, 13 (72.2%) with the altitude, 12 (66.7%) with the possibility of an aircraft accident, and nine (50%) with the aircraft noise.

G.2.2.3 *Interrupted activities*

Low altitude flights caused high impacts in the category of interrupted activities beneath VR-245. One-third of the respondents (6, or 33.3%) reported sleep interruption or interruption of three or more non-sleep activities during the previous month. Three respondents (16.7%) reported sleep disruption. One respondent (5.6%) reported the interruption of three, 2 (11.1%) reported the interruption of four, 2 reported the interruption of five non-sleep activities. No one reported the interruption of more than five non-sleep activities. On the other end of the scale, four respondents (22.2%) reported no interruption of non-sleep activities, 4 reported the disruption of one non-sleep activity, and 5 (27.8%) reported the interruption of two such activities.

G.2.2.4 *Community disruption*

One (7.7%) of the local officials and newspaper editors was aware of community disruption resulting from the low altitude flights, indicating a low impact level.

G.2.2.5 *Disturbance of young in group facilities*

The impacts of low altitude flights on young children in group facilities is negligible. None of the local officials and newspaper editors had received complaints regarding the disturbance of the very young in group facilities beneath VR-245. None of the people interviewed face-to-face mentioned disturbance of children as something they dislike about low altitude flights.

G.2.2.6 *Reduced livestock productivity*

None of the officials and newspaper editors contacted were aware of reported losses in productivity from commercial livestock operations beneath VR-245. Impacts in this area apparently are negligible. Further, livestock disturbance was not reported during face-to-face interviews.

G.2.2.7 *Impact indicators*

None of the respondents surveyed beneath VR-245 had made a formal complaint about the low altitude flights. However, 8 respondents (44.5%) reported making informal complaints to friends or family. Five of these had complained more than once a month, and 3 had complained between once a month and three times a year. In addition, 45.5% of the local officials and newspapers had received complaints about the flights.

Two respondents (11.8%) beneath VR-245 either were opposed or strongly opposed to the flights. Six (35.3%) neither opposed nor supported the flights, and 9 (52.9%) either supported or strongly supported these activities.

G.3 NOISE

G.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP the L_{dnmr} for VR-245 is 53 dB at centerline and 52.1 dB at 3 miles from centerline. Thus, for VR-245 only, the calculated noise level is a little higher than the ambient noise level. Beneath the area where VR-245 enters R-2301E, the L_{dnmr} is 56.6 dB at centerline of VR-245 and 55.9 dB 3 miles from centerline (Fig. G.3.1).

The maximum SEL for VR-245 is 122.8 dB at centerline and 80.2 dB 3 miles from centerline. Beneath the area where VR-245 enters R-2301E, the maximum SEL is also 122.8 dB at centerline and 80.2 dB 3 miles from centerline.

While parts of VR-245 have a rather heavy flying schedule, it is flown by relatively quiet aircraft. With a centerline L_{dnmr} of 53 dB only a very small percentage (2 to 3%) of the affected population is expected to be highly annoyed. Concurrent use of this airspace increases the centerline calculated L_{dnmr} to 57 dB, at which 3 to 9% of the population may be highly annoyed. At these levels, anticipated stress is insufficient to cause additional risk for hypertension. On the basis of the noise levels calculated, the impact level for human health impacts is negligible.

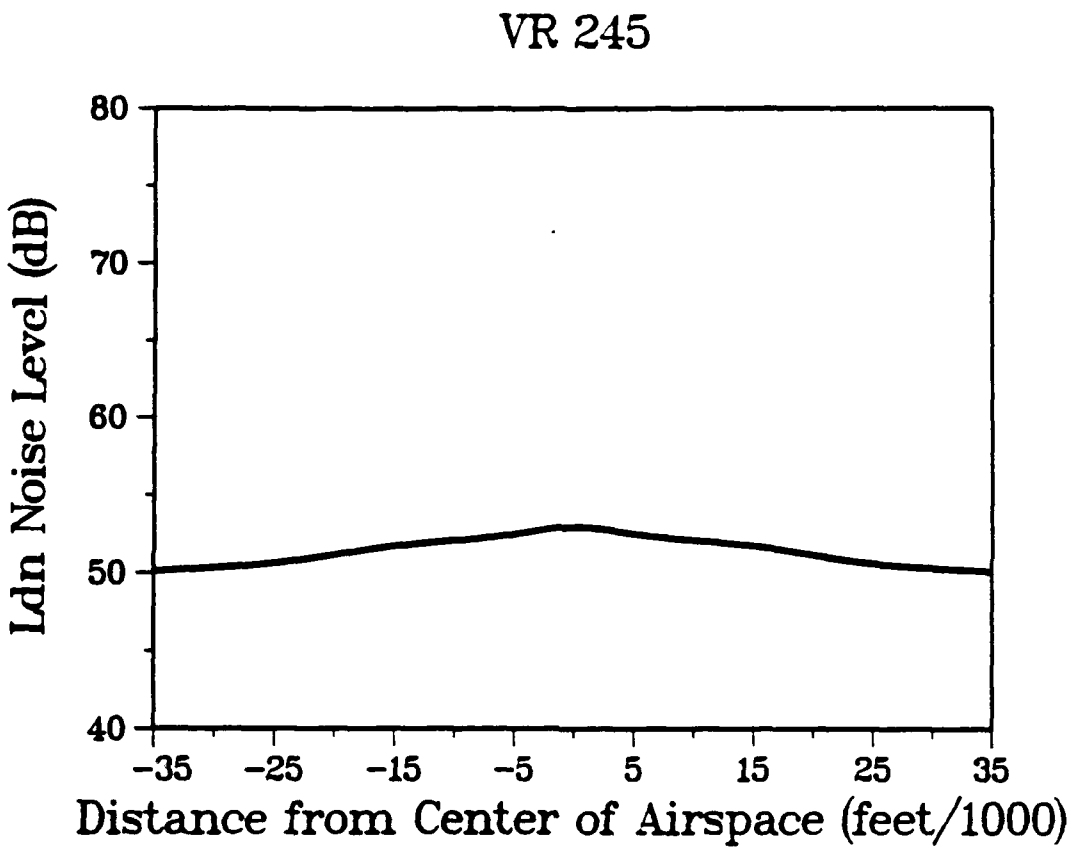


Fig. G.3.1. L_{dnmr} levels for VR-245.

G.4 AMERICAN INDIANS

G.4.1 Resource Description

The Fort McDowell Reservation is located under VR-245 (Fig. G.4.1). The 24,000 acre reservation is used for farming, ranching, and sand and gravel operations. Most of the 450 tribal members, Mohave and Apache, live on the southern end of the reservation.

G.4.2 Impact Assessment

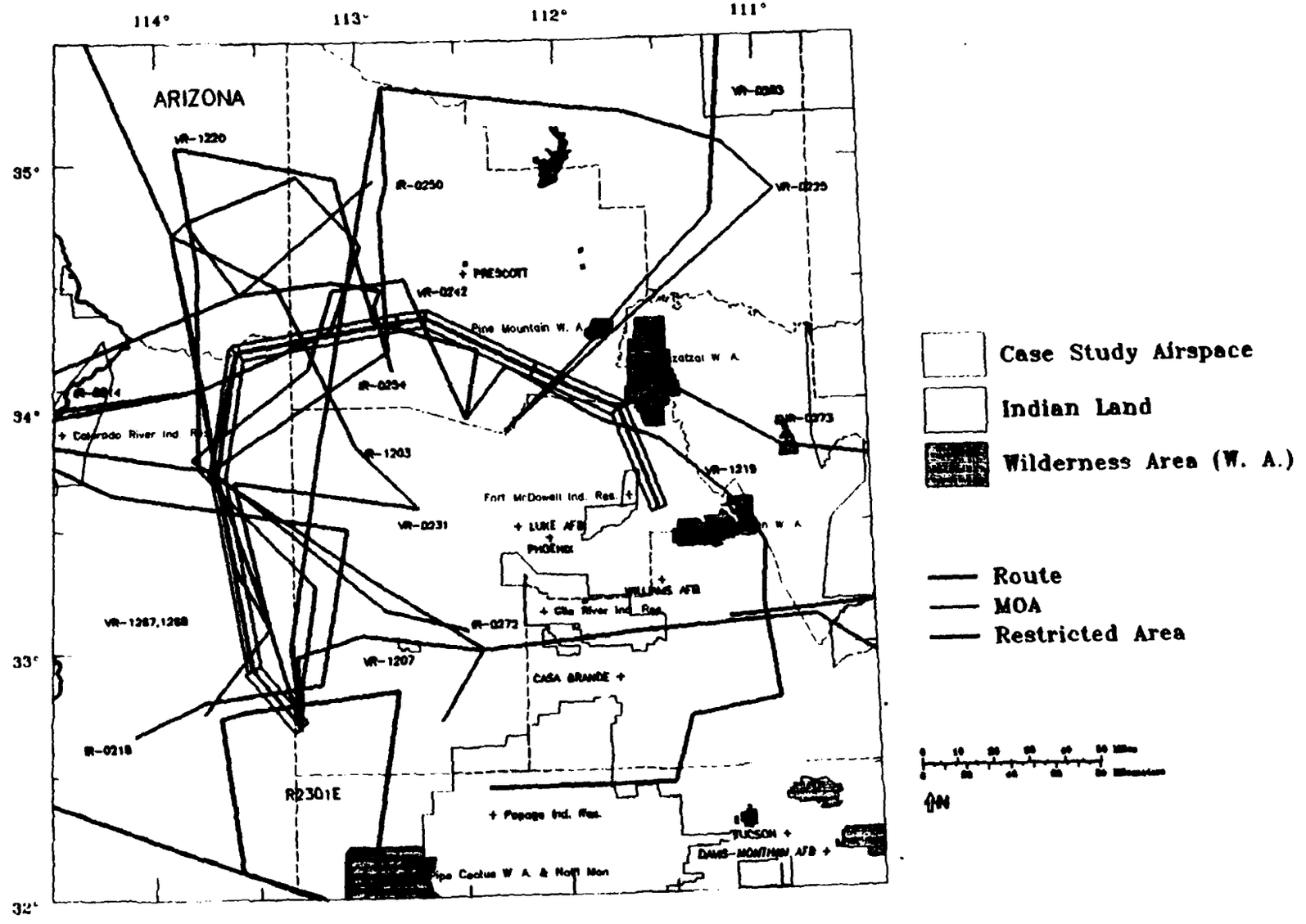
Interviews with tribal representatives indicated that because the flights occur over the northern corner of the reservation and the people live on the southern portion, there is little or no concern about the occurrence of low altitude flights. Furthermore, no areas of religious significance are located near the flying activity. Their one concern was possible disruption of eagle nesting and breeding areas on the Verde river. Eagle feathers are an important resource in the conduct of some Indian ceremonies. The impact to Indians at Fort McDowell Reservation is determined to be negligible. A discussion of American Indian reservations located under other MTRs in this area is included in Appendix D.3.3.

G.5 STRUCTURES

G.5.1 Resource Description

Typical structures under VR-245 include one and two story frame buildings; one and two story adobe buildings; mobile homes; frame barns, outbuildings, and water towers; and prefabricated metal buildings. The building stock is typical of the arid southwest.

Fig. G.4.1 Federally protected areas in the VR-245 region.



G.5.2 Impact Assessment

Most of the flight activity in VR-245 is made up of smaller aircraft. These aircraft, according to calculations presented in Appendix E, have essentially no potential for affecting structures, even with a high number of sorties.

G.6 WILDERNESS AND PARKS

G.6.1 Resource Description

Beneath VR-245 are the Castle Creek Wilderness and the Verde River Bald Eagle Breeding area. VR-245 skirts the border of Mazatzal Wilderness. Concurrent airspaces fly over the Cabeza Prieta National Wildlife Refuge, Galiuro Wilderness, Sierra Ancha Wilderness, Four Peaks Wilderness, Pine Mountain Wilderness, and Superstition Wilderness.

These areas are generally used for hiking, back-country camping, horse-back riding, and bird watching. Trophy hunting and some small game hunting are conducted in areas adjacent to the wilderness areas.

G.6.2 Impact Assessment

Interviews were conducted with members of local chapters of The Audubon Society, The Wilderness Society, The Nature Conservancy, officials of Coronado National Forest, Prescott National Forest and Tonto National Forest, and other officials from the Arizona Department of Fish and Wildlife. National Forest Service officials who serve as caretakers of the Castle Creek Wilderness, Pine Mountain Wilderness, Galiuro

Wilderness, Sierra Ancha Wilderness, Four Peaks Wilderness and Superstitions Wilderness provided information about impacts to these wilderness areas and their usage. In addition, preliminary contacts with officials in these areas indicated that it would be necessary to contact Cabeza Prieta Wildlife Refuge to obtain the full range of concerns. Overall concerns included possible disruption of visitor enjoyment of wildlife, disruption of solitude, contradiction of wilderness character, and disruption of caretaker activities through failure to maintain adequate channels of communication.

The principle positive impact mentioned was the possibility that the restricted access to the Cabeza Prieta refuge required by the military contributed to the increase of the Desert Big Horn Sheep.

Several concerns were expressed. One concern was nesting of bald eagles at particular sites in Salt River and Verde River canyons, which is an important issue with birdwatchers. The preservation of the Sonoran Pronghorn Antelope and Desert Big Horn sheep was of concern to wilderness users because of their trophy hunting value to sportsmen and their viewing value to other users.

Hikers' complaints about solitude and wilderness character contradiction were reported by caretakers. The predominant complaint involved the noise of aircraft and interruption of their solitude and the aircraft's intrusion as a contradiction to the purpose of maintaining areas unaffected by man.

NFS officials qualified this position by acknowledging the need for military training activities and expressing their desire to protect the more sensitive wilderness areas or locations in wilderness areas. They also maintain that Air Force planes routinely fly too close to a NFS lookout tower in the Sierra Ancha Wilderness Area and to a high peak

of Mazatzal mountains and spooked horses which threw their riders at Chilson Spring in Mazatzal Wilderness Area.

Officials reported that impacts to wilderness character, i.e., a user's sense of removal from civilized influences and solitude, intensify in areas of frequent use near urban areas, such as the Superstition Wilderness. They also reported that wilderness character interference with caretaker activities was reported by officials, and illustrated with reports of towers being buzzed by military aircraft. Officials reported that ongoing consultation was not maintained adequately, and illustrated their reports with examples of the Air Force failing to agree to specific altitudes over wilderness areas and to respond to reports of route infractions. Failure to maintain adequate consultation will intensify impacts to caretaker activities.

G.7 WILDLIFE

G.7.1 Resource Description

Wildlife habitat under the southern leg of VR-245 is primarily Sonoran desert scrub and related plant associations, featuring creosote bush, bursage, saltbush, mesquite, and galleta. Higher elevation areas (e.g., Eagletail Mountains west of Phoenix, crossed by the route) are dominated by palo alto-mixed cacti associations (Remington and deVos 1985). Northern portions of the route cross chaparral, which includes scrub oak, buckthorn, mountain mahogany, manzanita, and skunk bush. Small areas of woodland and grama grassland are also crossed by the route. Vegetation along stream corridors is often in striking contrast to the surrounding semi-desert. At the most arid, low elevation sites, screwbean mesquite dominates, giving way to the introduced tamarisk (saltcedar) where seasonal flooding may occur. As moisture increases, cottonwood, introduced Russian olive, willow and mesquite may be included as co-dominants with

the non-native saltcedar. On relatively moist and humid sites, saltcedar gives way to a dense cottonwood overstory and a Russian olive understory. At higher elevations, conifers may be found in riparian zones (Brinson et al. 1981).

VR-245 borders some important wildlife areas (e.g., Kofa National Wildlife Refuge, Prescott and Tonto National Forests, Alamo Lake), but in general birds (Phillips et al. 1983) and mammals (Hofmeister 1986), with the possible exception of bighorn sheep, are not especially notable, diverse, or abundant along the route. Major concentrations of large game, such as elk, mule deer, pronghorn antelope, bears, and cougar, occur for the most part outside of the route area. Bighorn sheep have been released in areas crossed by the route, such as the Eagletail Mountains (Remington and deVos 1985) and near Lion Mountain southeast of Horseshoe dam (Burton 1987). Important habitat for bighorns occurs in the Granite Mountains, the Little Horn and Tank and Palomas Mountains (Burton 1987); the Kofa Mountains west of the route are an important habitat area for the species. The northern part of the route enters habitat for mule and white-tail deer, and hence cougar, which occur principally in mountain coniferous areas. The endangered Sonoran pronghorn antelope is seasonally abundant in the vicinity and south of the southern terminus of the route, whereas bighorn sheep occur west of the southern segment (Hofmeister 1986). Other mammals typifying the habitats characteristic of the route include desert shrew, various bats, pocket mice, kit fox, spotted skunk, and raccoon.

Bald eagles nest along the Salt and Verde rivers (Stewart Mountain dam and Horseshoe dam on the eastern route segment) and at Alamo Lake in the west (Burton 1987). In addition, the state-listed Mississippi kite is found in the east at Sycamore Creek and the Verde river. The nearest waterfowl migration corridors occur primarily to the west down the Colorado River (Bellrose 1976). Birds typifying the habitats characteristic of the route include redtailed and Harris' hawks, Gambel quail, burrowing and elf owl, flickers,

doves, catbird and other thrashers, cactus wren, brown and other towhees, and blacktailed and western gnatcatchers.

In addition to the bald eagle (E) and the Sonoran pronghorn antelope (E), federally listed species which may occur are the grizzly bear (T), jaguar (E), Yuma clapper rail (E), American peregrine falcon (E), Aleutian Canada goose (E), and thick-billed parrot (E).

G.7.2 Impact Assessment

Bald eagles breeding and nesting along the Salt and Verde rivers (e.g., Horseshoe Reservoir) and at Alamo Lake are a concern due to the declining status of the bird in the state. Bald eagles exhibit variable responses to aircraft and other human disturbance, but have been known to abandon nests. Desert bighorn sheep occur near Lion Mountain and in the Granite Wash, Little Horn, Tank and Palomas Mountains. Again, although sheep exhibit variable responses to aircraft, they may be adversely affected, especially during lambing. However, sheep response to aircraft observed in western Arizona involved leaving an area only for flights lower than 150 ft AGL (Krausman and Hervert 1982). The minimum altitude for this route is 500 ft AGL.

The Arizona Game and Fish Department (Weaver 1987; Burton 1987) has expressed concern over possible effects on bald eagle breeding and nesting, bighorn sheep lambing and reestablishment, and disturbance of pronghorn antelope and Mississippi kite. In light of these concerns and the potential for conflicts with wildlife, impacts are classed as moderate for both endangered species and other wildlife for this route.

These agency concerns are offset partially by the minimum altitude (500 ft AGL) for the route. Intensity of impacts is probably low. On the other hand, at least 18 other

military training routes either cross or parallel VR-245, resulting in a high level of activity. Given the uncertainty of impacts and the occurrence of several species of sensitive wildlife, impacts of this route are judged to be moderate for both endangered species and other wildlife.

G.8 LIVESTOCK AND POULTRY

G.8.1 Resource Description

VR-245 goes west from the Phoenix area into arid land with large, widely scattered livestock and poultry operations. Among the states, Arizona ranks in the upper 20s to the 40s on measures of livestock and poultry production (USDA 1987). Collectively, the counties traversed by the route account for around half of the statewide production, except for turkeys, in which case 98% of the production and 40% of the farms occur in the counties that are beneath the route (ORNL 1989). About half of the production of livestock and poultry reported for counties under VR-245 occurs in Maricopa county, which ranks at or near the top within the state for most measures. However, the portion of the route in Maricopa county is in the vicinity of Phoenix, so that much of the production reported would not be affected by the route. Significant turkey and hog production for the state is reported for Yavapai and Yuma counties. No mink are reported from any counties.

G.8.2 Impact Assessment

The route has few ranches and only one poultry farm; impacts are therefore expected to be negligible for both livestock and poultry. State agricultural officials have expressed no concerns.

G.9 AIR QUALITY

G.9.1 Resource Description

Parts of Maricopa County, which includes the Phoenix metropolitan area, are designated by EPA as non-attainment areas with respect to NAAQS for O_3, CO, and TSP (EPA 1989). Although VR-245 passes over parts of Maricopa County, at its nearest the route passes about 25 to 30 miles from the City of Phoenix. It does not pass over the only designated area of NAAQS non-attainment in Maricopa County, which is restricted to the area around Phoenix known as the Maricopa Association of Governments Urban Planning Area (40 CFR 81.303).

There are two PSD Class I areas, the Superstition Wilderness and the Mazatal Wilderness, which are within 6 miles of VR-245 (see Fig. G.4.1). The nearest of these is the Mazatal Wilderness, which is within 0.5 mile of the edge of the VR-245 route corridor and is approximately 2.5 miles from the centerline of VR-245.

G.9.2 Impact Assessment

The air quality impact analysis for VR-245 indicated that the incremental concentrations of air pollutants from aircraft engine exhaust would be well below levels of concern for the area. The maximum predicted incremental concentrations under VR-245 were less than 5% of the NAAQS and PSD Class II increments, which are applicable at all areas under the route.

The worst-case route-centerline level of impact along any segment of VR-245 was between 5% and 50% of the PSD Class I 24-hr TSP increment. Although no PSD Class I areas exist under VR-245, the Mazatal Wilderness Area, a PSD Class I area, is

only about 0.5 mile from the edge of VR-245. However, air quality impacts along the worst-case segment of VR-245 were primarily a result of traffic from concurrent routes. These concurrent routes do not continue on the portion of VR-245 near the Mazatal Wilderness. Impacts directly beneath the VR-245 segment near the Mazatal Wilderness were predicted to be less than 5% with respect to all PSD class increments. Thus, the air quality impacts from VR-245 and concurrent routes are considered to be negligible with respect to all NAAQS and PSD increments (see Table 4.1.9).

GAMECOCK C MOA: SOUTH CAROLINA

H. GAMECOCK C MOA (SOUTH CAROLINA)

H.1 AIRSPACE

The Tactical Air Command's Gamecock MOA is located between Georgetown and Florence in the eastern part of South Carolina (Fig. H.1.1). Established on April 1, 1976, area C of the Gamecock MOA covers four counties in South Carolina and is scheduled by the 354th Tactical Fighter Wing at Myrtle Beach AFB.

The area beneath the Gamecock C MOA is located in the Coastal Plains region of the United States. The region is flat and parts of it are swamp-like, but much of the area has trees and other cover which can restrict visibility despite the level terrain. Open land is generally used for agriculture and has good visibility.

Gamecock C MOA was established for training TAC aircrews at altitudes from 100 ft AGL to 7,000 ft MSL. The MOA covers an area of 829 sq. miles. The MOA is available to the Air Force between 8 a.m. and 10 p.m., Mondays through Fridays and occasionally on weekends.

Gamecock C is available for scheduling from 8:00 a.m. to 10:00 p.m. local time, Monday through Friday, and occasionally on weekends. The Air Force generally schedules operations for 7 hrs/day and uses the MOA about 6.5 hrs/day. It is currently used most heavily by the 354th TFW. In an average month in 1986, the sorties scheduled in Gamecock C were as follows:

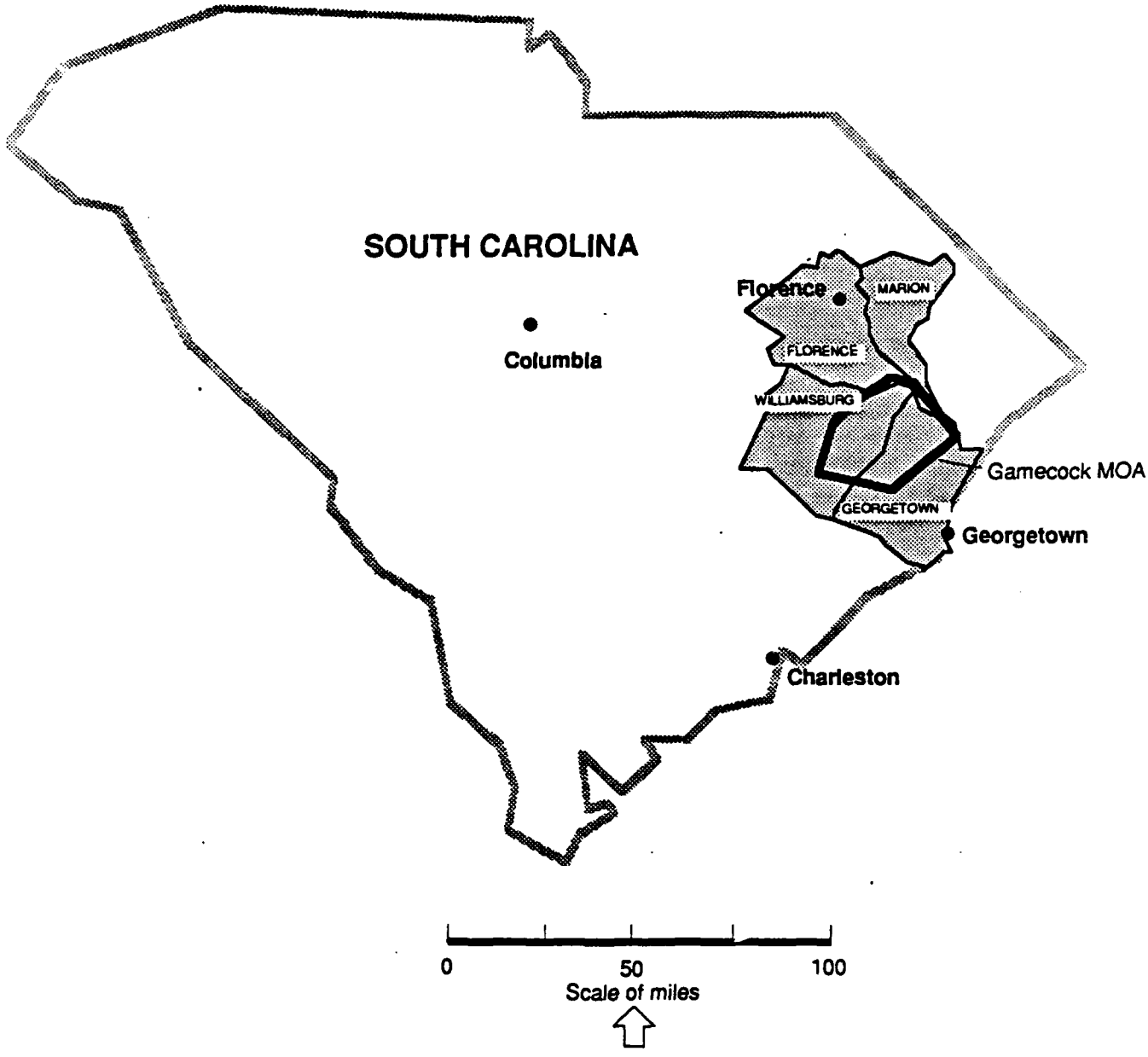


Fig. H.1.1. Map of the Gamecock C MOA Area.

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
A-10	220	300	340
F-16	74	500	550
Total	294		

Most of the flights in Gamecock C are concentrated in the middle of the MOA, away from the towns to the north and south.

There are two MTRs which cross into the Gamecock C MOA. The busiest of these is VR-1059, a TAC route scheduled by the 363rd Tactical Fighter Wing at Shaw AFB with the following scheduled usage in an average month in 1986:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
F-16	68	500	550
RF-4	9	500	550
C-130	1	500	250
Total	78		

Generally, these aircraft fly the middle portion of the route.

H.2 SOCIAL

H.2.1 Resource Description

Approximately 32,300 people lived beneath Gamecock C in 1980; the average population density was approximately 38.9 persons/sq. miles. The rural population density (this omits areas with more than 500 persons/sq. miles) beneath Gamecock C was 36.3 people/sq. miles. In comparison, the 1980 population density for South Carolina was 103.4 people/sq. miles, and the U.S. density was 64.0 people/sq. miles. Figure H.2.2 depicts population distribution under Gamecock C MOA. There are 7 towns beneath Gamecock C, the largest being Andrews (population 3129), Johnsonville (1421), and Hemingway (853).

H.2.2 Impact Assessment

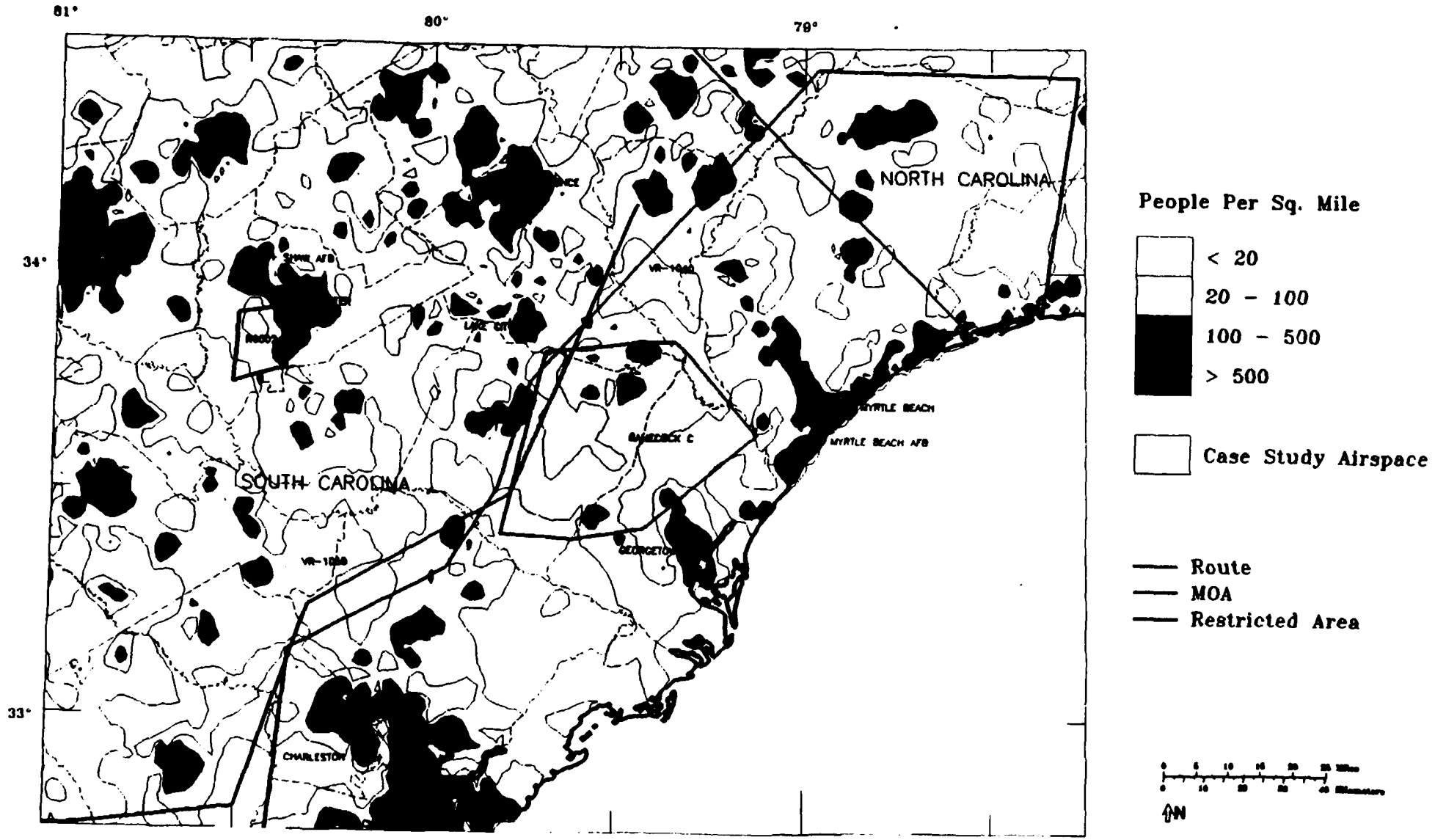
H.2.2.1 *Awareness*

Fifty-three respondents (89.8%) were aware of low altitude military flights in the vicinity. Telephone interviews with 13 local government officials and newspaper editors revealed that 11 (85%) were aware of flights in the area.

H.2.2.2 *Annoyance*

Twenty-eight respondents (47.5%) were highly annoyed with at least one aspect of the low altitude flights—a high impact. Twenty-two (37.9%) were highly annoyed by the possibility of an aircraft accident, 18 (30.5%) by the altitude of the flights, 16 (27.6%) by the aircraft noise, and 3 (5.1%) by the presence of the flights.

Fig. H.2.2 Population distribution in the Gamecock C MOA region.



Conversely, 22 respondents (37.3%) reported low annoyance with the low altitude flights on all four annoyance variables. Forty-eight (81.4%) reported low annoyance with the presence of the flights, 33 (56.9%) with the aircraft noise, 30 (50.8%) with the altitude, and 29 (50%) with the possibility of an aircraft accident.

H.2.2.3 *Interrupted activities*

Eighteen respondents (30.5%) reported sleep interruption or interruption of three or more non-sleep activities during the previous month (a high impact). Ten (16.9%) reported sleep disruption. One respondent (1.7%) reported the interruption of three non-sleep activities (personal conversations, telephone conversations, watching television or listening to the radio, reading or concentrating, work activities, or childrens' activities). Four respondents (6.8%) reported the interruption of four of these activities, 6 (10.2%) reported the interruption of five non-sleep activities, and 4 reported the interruption of six non-sleep activities. On the other end of the scale, 35 respondents (59.3%) reported no interruption of non-sleep activities, 8 (13.6%) reported the disruption of one non-sleep activity, and 1 (1.7%) reported the interruption of two such activities.

H.2.2.4 *Community disruption*

None of the local officials and newspaper editors were aware of community disruption resulting from the flights, indicating a negligible impact.

H.2.2.5 *Disturbance of young in group facilities*

None of the local officials and newspaper editors had received complaints regarding the disturbance of the very young in group facilities beneath Gamecock C. This indicates a negligible impact.

H.2.2.6 *Reduced livestock productivity*

None of the local officials and newspaper editors were aware of reported losses in productivity from commercial livestock operations beneath Gamecock C. Impacts in this area are apparently negligible.

H.2.2.7 *Impact indicators*

Of the respondents surveyed beneath Gamecock C, three (5.7%) had previously made one or two formal complaints about the low altitude flights. Seventeen respondents (28.8%) reported informal complaints to friends or family. Four of these had complained more than once a month, and 13 had complained three times a year or less. In addition, 16.7% of the local officials and newspapers had received complaints about the flights.

Overall, 16 respondents (30.2%) beneath Gamecock C were either opposed or strongly opposed to the flights. Eleven (20.8%) neither opposed nor supported the flights, and 26 (49.1%) either supported or strongly supported these activities.

H.3 NOISE

H.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP, the L_{dnmr} for Gamecock C is 62.3 dB at areas of intense activity and 61.3 dB 3 miles from the center (Fig. H.3.1). Beneath the area where VR-1059 crosses Gamecock C, the L_{dnmr} is 62.8 dB at centerline and 61.8 dB 3 miles from the route's centerline.

The maximum SEL for Gamecock C is 108.2 dB at areas of intense activity and 65.6 dB 3 miles from these areas. Beneath the area where Gamecock C and VR-1059 are concurrent, the maximum SEL is 122.7 dB at centerline and 80.1 dB 3 miles from centerline.

H.3.2 Impact Assessment

For the Gamecock MOA a day-night noise level of 62 dB was calculated. This level would result in just under 15% of the affected population being highly annoyed. Sporadic complaints may be identified. For areas in which there is also concurrent airspace, the use levels are low and the resultant overall noise levels are not appreciably different from those identified for the MOA. At the level of 62 dB, no effects on hypertension risk are anticipated. The resulting level of human impact is negligible.

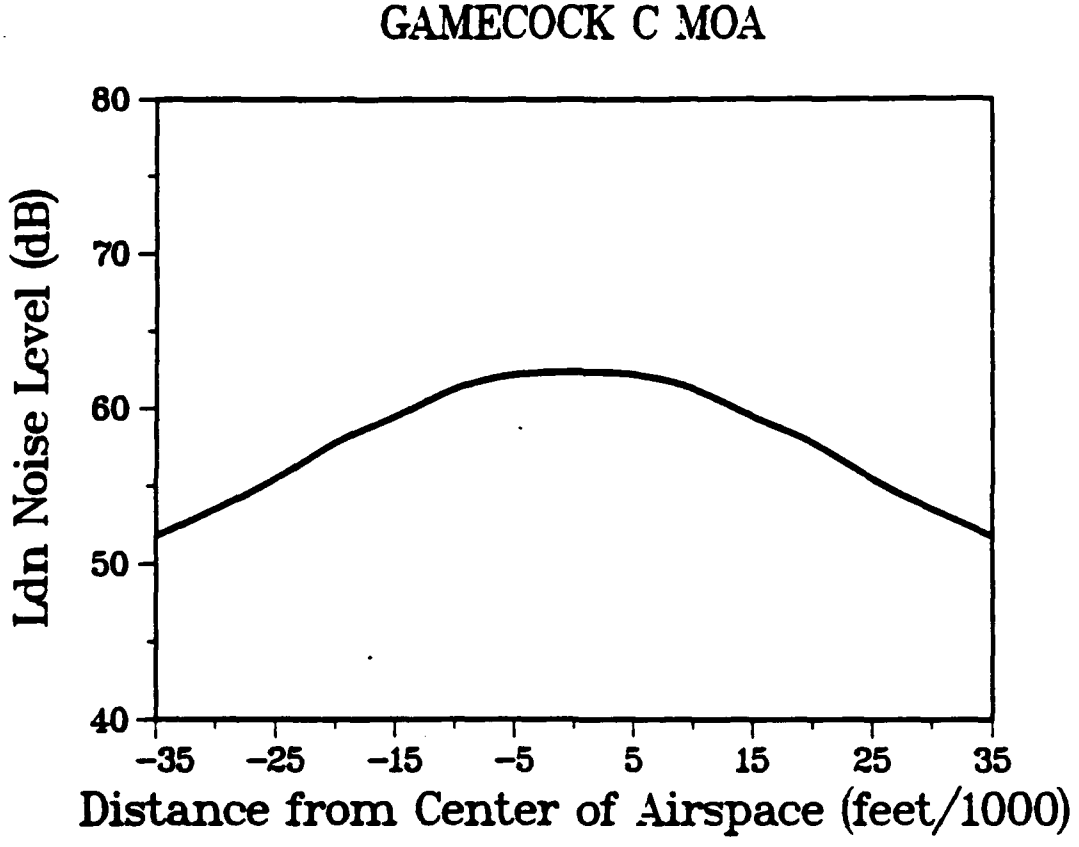


Fig. H.3.1. L_{dnmr} levels for Gamecock C MOA.

H.4 AMERICAN INDIANS

No sovereign American Indian groups are under or near the Gamecock C MOA (Fig. H.4.1).

H.5 STRUCTURES

H.5.1 Resource Description

Typical structures under Gamecock C MOA include one and two story frame buildings; one and two story brick buildings (including those with external plaster walls); mobile homes; frame barns and outbuildings; and prefabricated metal buildings. The building stock is typical of rural areas of the coastal southeastern states.

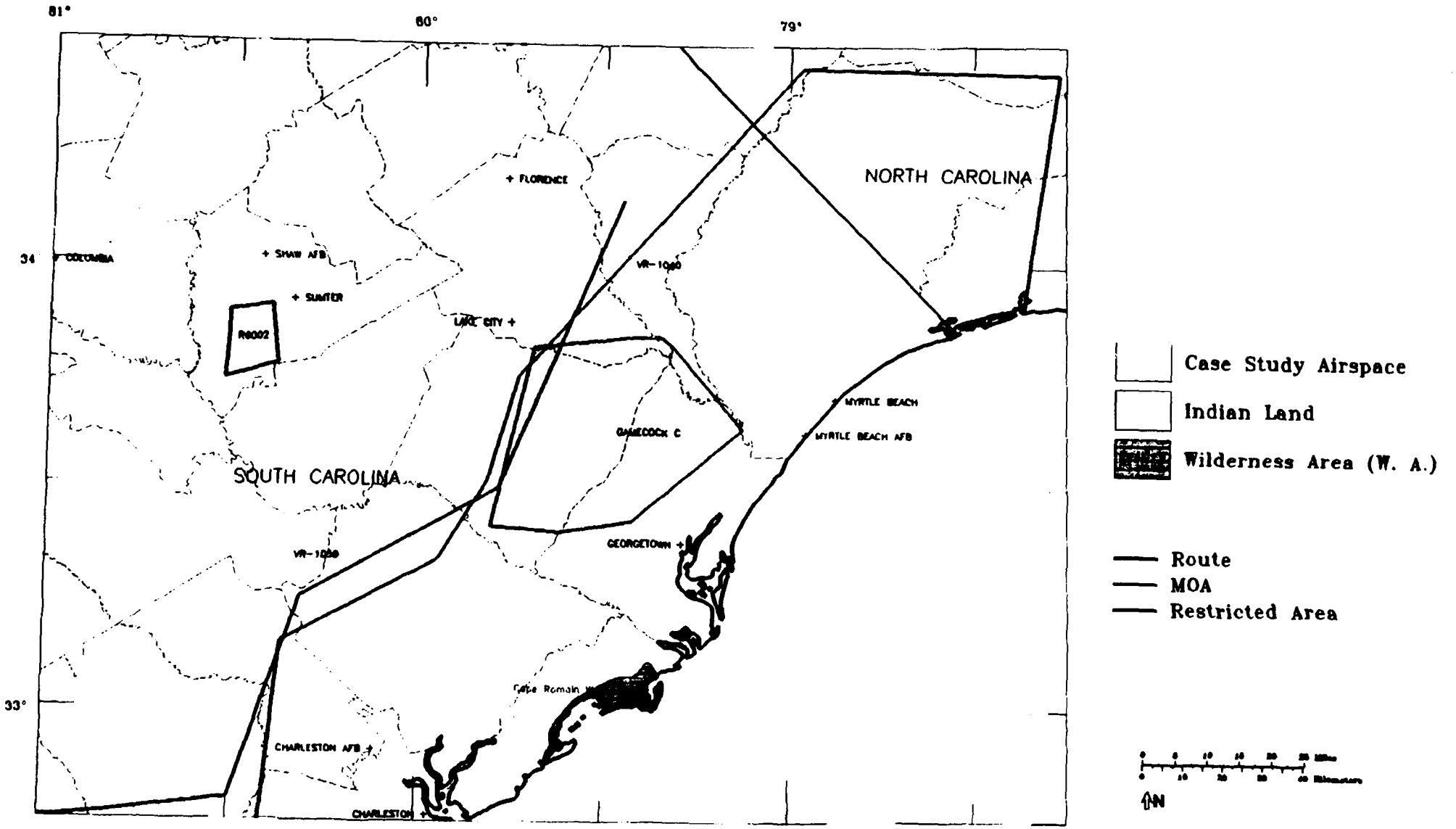
H.5.2 Impact Assessment

The Gamecock MOA use is dominated by light aircraft. Calculations performed in Appendix E demonstrate that such aircraft have little potential to affect structures.

H.6 WILDERNESS AND PARKS

No national parks or wilderness areas are under the Gamecock C MOA (Fig. H.4.1).

Fig. H.4.1 Federally protected areas in the Gamecock C MOA region.



H.7 WILDLIFE

H.7.1 Resource Description

Gamecock C MOA lies in the inner coastal plain of South Carolina, just north of several important wildlife areas (Francis Marion National Forest, Santee National Wildlife Refuge, Lake Marion, and Lake Moultrie). The MOA crosses and encompasses part of the Black River, and its northern leg follows the Lynches River for several miles. Positioned in this way, great diversity of vegetation and, hence, wildlife can be expected. Coastal Plain habitats are well represented in the area, typified by those of Francis Marion National Forest. Swamps, rivers, and floodplain and pine forests are interspersed with cleared farmland. Viewed from the air, forests predominate. Swamp forests are dominated by cypress, tupelo, and oak; floodplain forests typically support a greater mixture of bottomland hardwood species and pine. Upland sites frequently feature loblolly and other pines, and, in sandy areas, turkey oak.

Common mammals include white-tailed deer, racoon, mink, muskrat, short-tailed shrew, and various voles. Reptiles and amphibians include mole salamanders, chorus and tree frogs, water snakes, brown snake, and green snake.

Frequently flooded woodlands (swamp forest and bottomland hardwood forest) are important wintering grounds for waterfowl, especially wood duck and mallard; wood ducks also nest extensively in swamp forests. Inland freshwater marshes are wintering grounds for coots, grebes, and other ducks; in the summer, various herons and egrets are found. Large lakes such as those bordering the MOA are significant winter waterfowl areas and are important in summer for osprey and great blue heron (Potter et al. 1980). The area lies within the primary range of the wood duck, and moderate to high breeding populations of this species occur. The area is also the primary

wintering region for hooded and common mergansers. The MOA intersects migration corridors for several hundred thousand ducks, particularly blue-winged teal, shoveler, and gadwall (Bellrose 1976). Drier upland wooded sites may harbor wild turkey, woodcock, red-cockaded woodpecker, Bachman's sparrow, and brown-headed nuthatch. A variety of raptors occur in the various coastal plain habitats, including red-shouldered hawk, swallow-tailed and Mississippi kites, and barred and other owls. Pileated and other woodpeckers, and various species of warblers, thrushes, wrens, and sparrows also abound (Hamel et al. 1982).

The federally endangered and threatened animal species for counties in Gamecock MOA are the eastern cougar (E), the ivory-billed woodpecker (E), and the red-cockaded woodpecker (E).

H.7.2 Impact Assessment

Gamecock MOA in South Carolina intersects areas frequented by many species of wintering and nesting waterfowl. The area is also inhabited by wild turkey, raptors, and numerous mammalian species. As a result, the potential for disturbance of movements or behavior and for collisions with aircraft is relatively high and is increased by the low minimum altitude for flights of 100 ft AGL and the decreased visibility in forested areas. Accordingly, impacts to wildlife for the Gamecock MOA are considered to be moderate.

Of the Federally endangered and threatened animal species given in Sect. H.7.1, the cougar and ivory-billed woodpecker are believed to no longer occur here. The red-cockaded woodpecker is found within old-growth pine stands in Florence, Georgetown, and Williamsburg counties and is not likely to be greatly affected by flights. The formerly listed brown pelican, found primarily in coastal areas, may sometimes collide

with aircraft. Mortality resulting from such collisions is not considered a major threat to the species, which was endangered primarily as a result of pesticide pollution.

H.8 LIVESTOCK AND POULTRY

H.8.1 Resource Description

South Carolina ranks (USDA 1987) near the bottom of all states in most measures of livestock production except for hogs, where it ranks eighteenth. For poultry, the state ranks 15 in number of chickens and 11 in number of turkeys. No mink are reported for any counties. For the counties within the Gamecock C MOA, Florence and Williamsburg are leading counties within the state for hog and poultry (both chickens and turkeys) production (ORNL 1989). None of the counties under the MOA ranks high in the state for cattle or sheep production.

H.8.2 Impact Assessment

Within the Gamecock C area, Florence and Williamsburg counties contain a relatively high concentration of poultry operations. Occurrence of other livestock operations is low. Military low altitude flights would be expected occasionally to frighten domestic fowl, possibly causing mortality, sometimes extensive, from piling on and suffocation. Impacts of MOA flight operations are therefore considered to be moderate for poultry and low to negligible for other livestock. State agricultural officials have expressed no concerns, and none were reported by local officials surveyed (Sect. H.2.2).

H.9 AIR QUALITY

H.9.1 Resource Description

There are no designated NAAQS non-attainment areas in the counties beneath Gamecock C MOA (EPA 1989). There are no PSD Class I areas within 6 miles of Gamecock MOA.

H.9.2 Impact Assessment

The air quality impact analysis for the Gamecock C MOA indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be far below levels of concern for the area. The maximum predicted incremental concentrations for this MOA were less than 5% of the NAAQS and PSD Class II increments, which are applicable in the areas under the MOA. Thus, the air quality impacts of the Gamecock MOA are considered to be negligible.

TYNDALL MOAs A,C,D,E,F: FLORIDA

I. TYNDALL MOAs A, C, D, E, F (FLORIDA)

I.1 AIRSPACE

The Tactical Air Command's Tyndall MOA, established in January, 1978, is located in Florida's panhandle near Panama City (Fig. I.1.1); it is scheduled by the Air Defense Weapons Center at Tyndall AFB and consists of five low altitude sections. Section A covers 2 counties; Section C, 5 counties; Section D, 3 counties; Section E, 4 counties; and Section F, 2 counties.

The area beneath the Tyndall MOA is located in the Coastal Plains region of the United States, and much of it is covered by water. The terrain is very flat with little topographical relief although wooded areas can restrict visibility. There is also considerable open beach under the southern portion of the MOA.

The Tyndall MOA was established to provide training for TAC aircrews from an altitude of 500 ft AGL to 1,700 ft MSL in Section A; from 1,000 ft AGL to 1,800 ft MSL in Sections C and E and 1,000 AGL to 4,000 ft MSL in Sections D and F. The sections of Tyndall MOA cover the following areas:

MOA section	Land area (sq. miles)	Water area (sq. miles)
A	181	0
C	812	0
D	338	0
E	1200	194
F	216	212

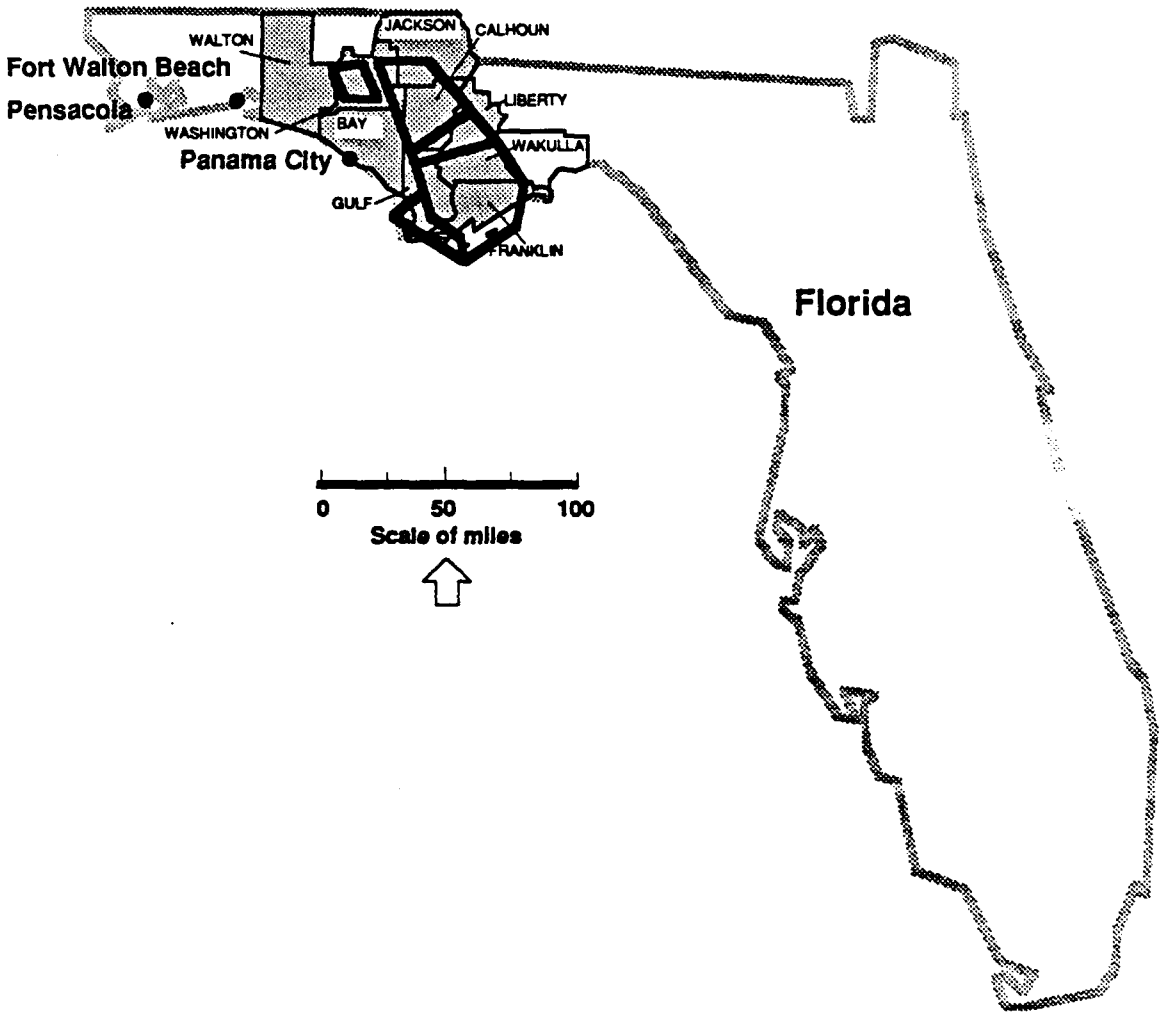


Fig. I.1.1. Map of Tyndall region.

The Tyndall MOA may be scheduled by the Air Force between 6:30 a.m. and 10:00 p.m. Monday through Friday.

The Tyndall MOA is available for scheduling from 6:30 a.m. to 10:00 p.m. local time, 5 days a week (Monday through Friday). The Air Force typically schedules and uses the MOA heavily during this time period. In an average month in 1986, the aircraft sorties scheduled on the low altitude sections of the Tyndall MOA were as follows:

Section A		Typical altitude (ft. AGL)	Typical speed (mph)
F-15	10	1000	550
Sections C-F:			
F-15	193.3	500	550
F-16	10.0	500	550
F-4	10.0	500	550
B-52	6.7	500	370
F-5	3.3	500	520
Total	223.3		

Sections A and C are concurrent with other airspace by two MTRs; the other sections are not crossed. The busiest of these routes is VR-1017, which is scheduled by the 187th Tactical Fighter Group (ANG) at Dannelly Field in Montgomery, Alabama. VR-1017 had the following number of aircraft sorties scheduled in an average month in 1986:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
F-4D	12.0	500	550
F-16	8.2	500	550
T-38	1.6	500	430
F-111	0.7	500	550
F-15	0.6	500	550
T-33	0.6	500	400
A-10	0.2	500	340
Total	23.9		

I.2 SOCIAL

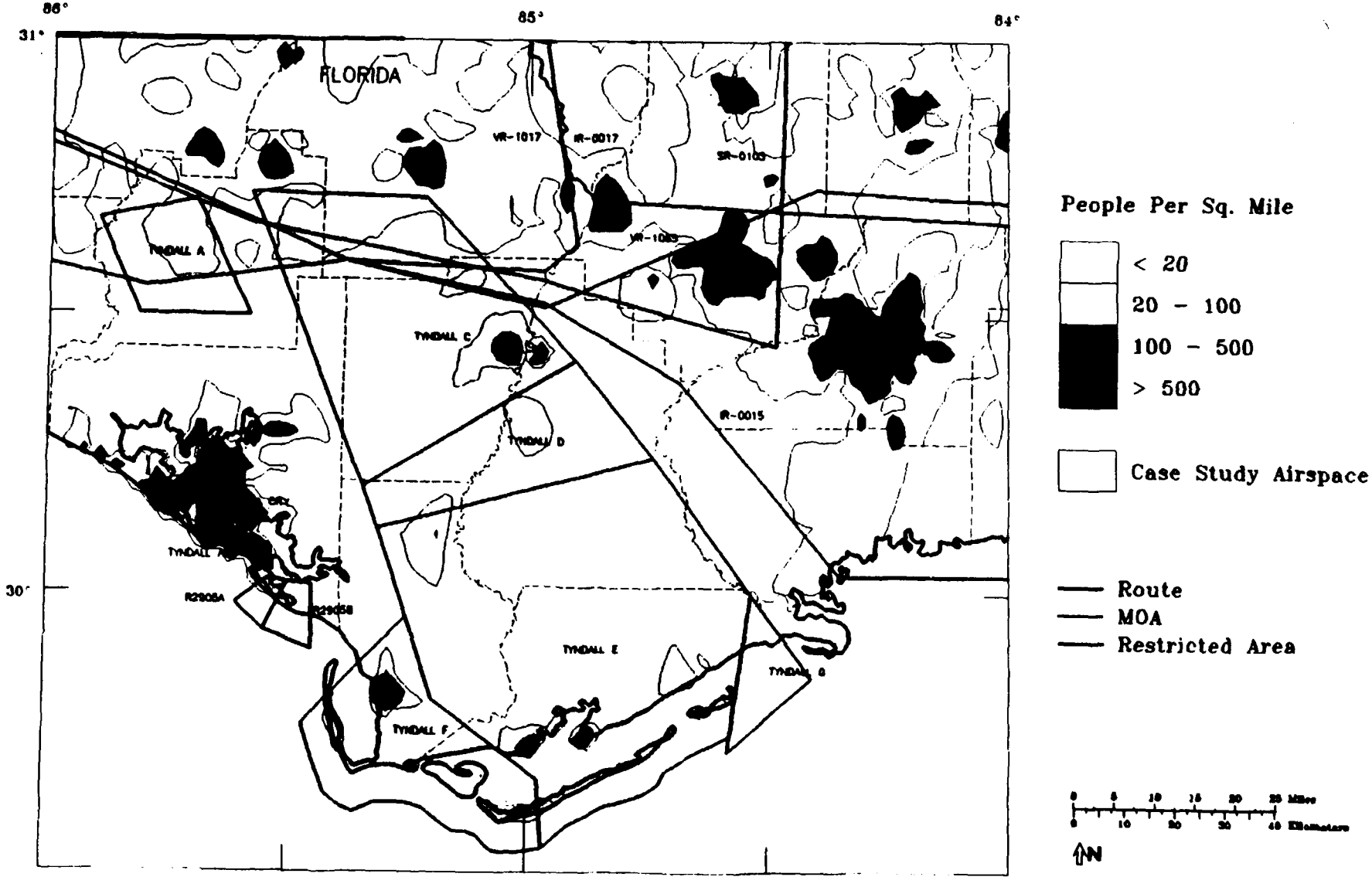
I.2.1 Resource Description

Approximately 39,000 people lived beneath the Tyndall MOA in 1980; the average population density was approximately 12.3 persons/sq. miles. The rural population density (this omits areas with more than 500 persons/sq. miles) beneath Tyndall MOA was 11.4 people/sq. miles. In comparison, the 1980 population density for Florida was 180.0 people/sq. miles, and it was 64.0 people/sq. miles for the United States. Figure I.2.2 portrays population distribution under the Tyndall MOA. There are 25 towns beneath the Tyndall MOA, the largest being Blountstown (population 2,632), Apalachicola (2,565), and Wewahitchka (1,742).

I.2.2 Impact Assessment

One hundred seventeen face-to-face interviews were conducted under Tyndall MOA. An additional 35 telephone interviews were conducted with key informants. Analyses of interview data indicate that, overall, the social impacts of low altitude flights under

Fig. I.2.2 Population distribution in the Tyndall MOA region.



Tyndall MOA are moderate. Both annoyance and activity disruption were moderate impacts. Reported economic losses due to reduced livestock productivity constitute a low impact. And, impacts are negligible with regard to community disruption and disturbance of young children in group facilities.

I.2.2.1 *Awareness*

Eighty-eight respondents (75.2%) were aware of low altitude military flights in the vicinity. Telephone interviews with 35 local government officials and newspaper editors revealed that 32 (91%) were aware of such flights in the area.

I.2.2.2 *Annoyance*

Annoyance impacts are moderate beneath Tyndall MOA since 30 respondents (28.4%) were highly annoyed with at least one aspect of the low altitude flights. Twenty-four (20.9%) were highly annoyed by aircraft noise, 17 (14.9%) by the possibility of an aircraft accident, 15 (13%) by the altitude of the flights, and 4 (3.5%) by the presence of the flights.

Conversely, 62 respondents (53.4%) reported low annoyance on all four annoyance variables; 103 (89.6%) reported low annoyance with the presence of the flights, 88 (75.5%) with the altitude, 87 (76.3%) with the possibility of an aircraft accident, and 73 (63.5%) with the noise.

I.2.2.3 *Interrupted activities*

Activity interruption/constitutes a moderate impact. Sleep interruption or interruption of three or more non-sleep activities during the previous month was reported by 16

respondents (13.9%). Eight of these respondents, 8 (7.4%) reported sleep disruption, 4 (3.5%) reported the interruption of three non-sleep activities, and 3 (2.7%) reported the interruption of each four, five, and six non-sleep activities. No non-sleep activity interruption was reported by 84 respondents (74.3%). Eight respondents (7.1%) reported the disruption of one non-sleep activity, and 8 reported the interruption of two such activities.

I.2.2.4 *Community disruption*

Community disruption is negligible under Tyndall MOA, since none of the local officials and newspaper editors were aware of community disruption resulting from the low altitude flights.

I.2.2.5 *Disturbance of young in group facilities*

Disturbance of young children in group facilities constitutes a negligible impact. None of the local officials and newspaper editors contacted had received any complaints regarding such disturbance. Further, two respondents mentioned effects on children as a negative aspect of low altitude flights.

I.2.2.6 *Reduced livestock productivity*

One (2.9%) of the local officials and newspaper editors was aware of reported losses in productivity from commercial livestock operations (a low impact). No face-to-face interview respondents indicated that livestock disturbance is a problem.

I.2.2.7 *Impact indicators*

One respondent (1.1%) previously had made one or two formal complaints about the low altitude flights. Twenty-one respondents (18.2%) reported ever making informal complaints to friends or family. Five of these had complained more than once a month, 5 complained between once a month and three times a year, and 11 complained three times a year or less. Also, 42.9% of the local officials and newspapers had received complaints about the flights.

Nearly half the respondents (42, or 48.3%) either supported or strongly supported low altitude flights and 26 (29.9%) neither opposed nor supported them. Approximately one-fifth of the respondents either opposed or strongly opposed the flights.

I.3 NOISE

I.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP, the L_{dnmr} for Tyndall A is 50.1 dB at the center of the MOA and 50.1 dB 3 miles from the center (Fig. I.3.1). For Sections C, D, E, and F the L_{dnmr} is 51.8 dB at the center of the MOA and 51.2 dB 3 miles from the center (Fig. I.3.2). Beneath the area where VR-1017 crosses the Tyndall MOA, the L_{dnmr} is 54.4 dB at centerline and 54 dB 3 miles from the route's centerline. Thus, for all these situations, the calculated noise levels are little more than the ambient noise levels.

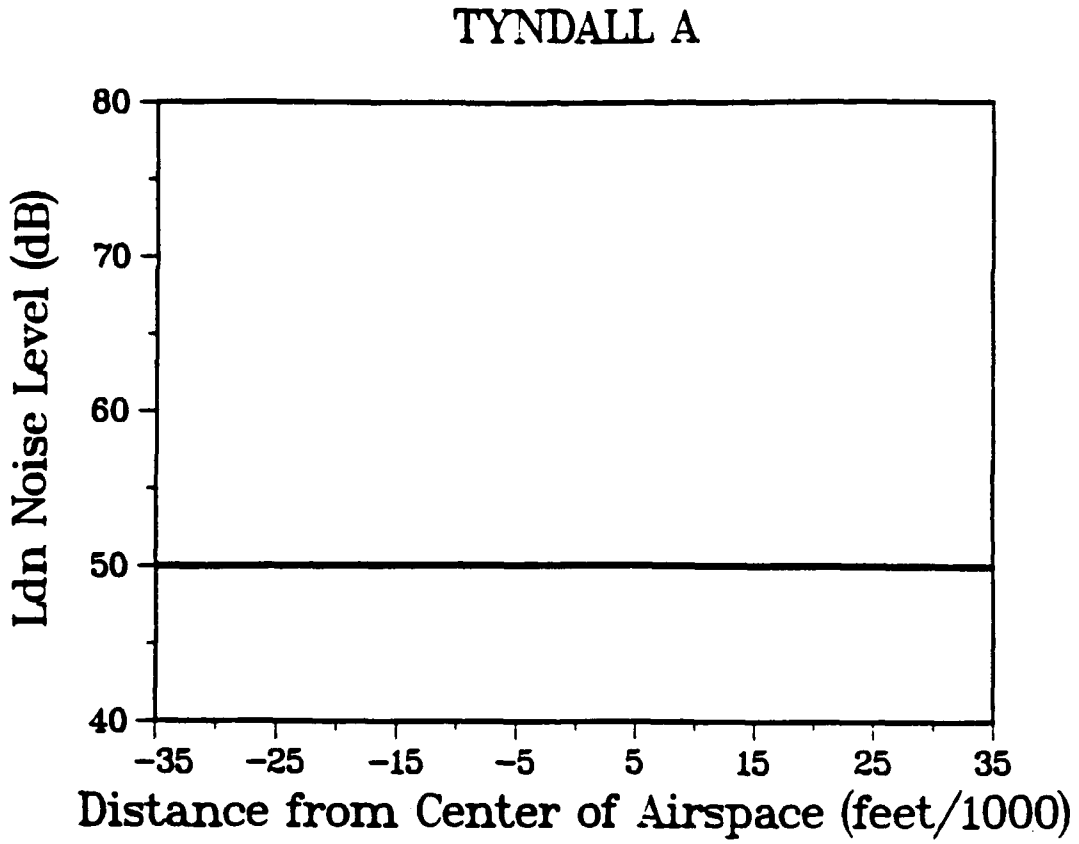


Fig. I.3.1. L_{dnmr} levels for Tyndall A MOA.

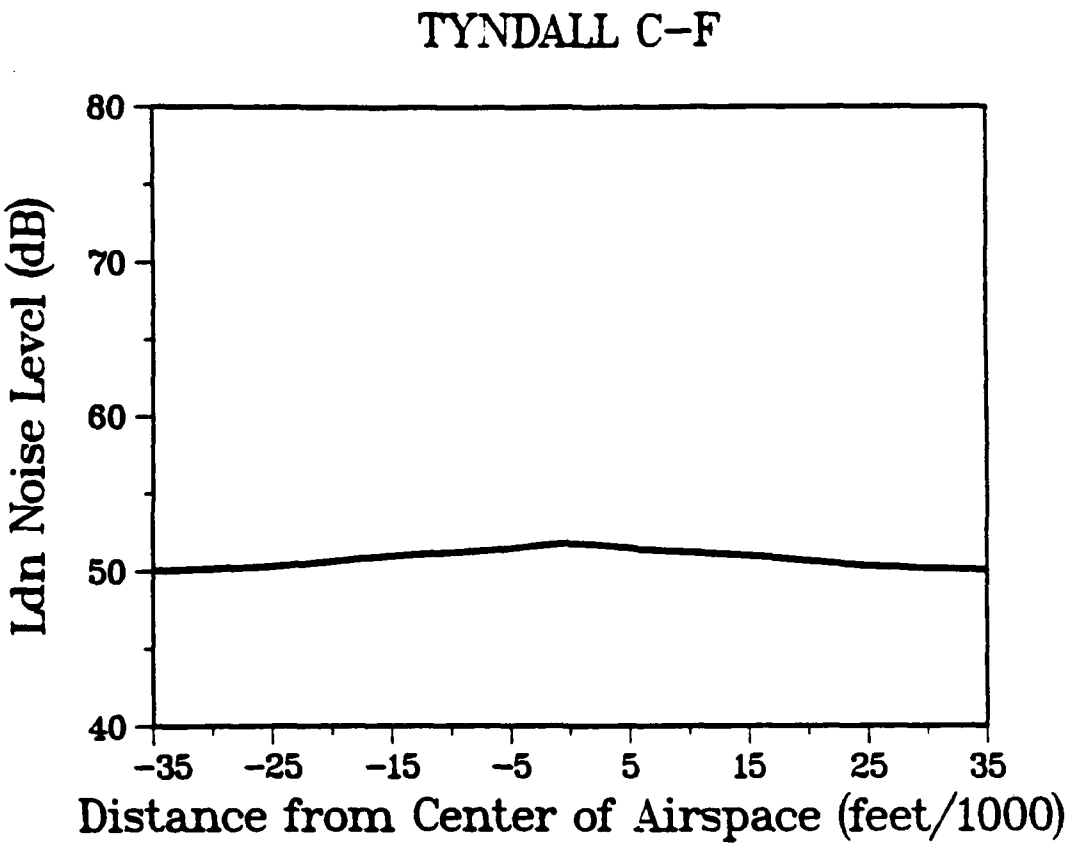


Fig. I.3.2. L_{dnmr} levels for Tyndall C-F MOA.

The maximum SEL for Tyndall A is 114.1 dB at the MOA's center and 71.5 dB 3 miles from the MOA's center. For Sections C, D, E, and F the maximum SEL is 122.7 dB at the center of the MOA and 80.1 dB 3 miles from the MOA's centers. Beneath the area where VR-1017 crosses the Tyndall MOA, the maximum SEL is 122.7 dB at centerline and 80.1 dB 3 miles from centerline.

I.3.2 Impact Assessment

Aircraft in the Tyndall MOA produce negligible noise impacts both under the MOA itself and in those locations where intersections with other air spaces occur. Using the conventional annoyance versus L_{dnmr} relationship, 2 to 3% of the persons overflown would be highly annoyed as a result of the 52 dB noise level for the MOA and the 54 dB level for the areas of concurrent use. No community reaction would be expected. No actual health impacts are anticipated with regard to increased risk of hypertension. On the basis of the diminutive values of noise exposures, the level of significance for the human health impacts is negligible.

I.4 AMERICAN INDIANS

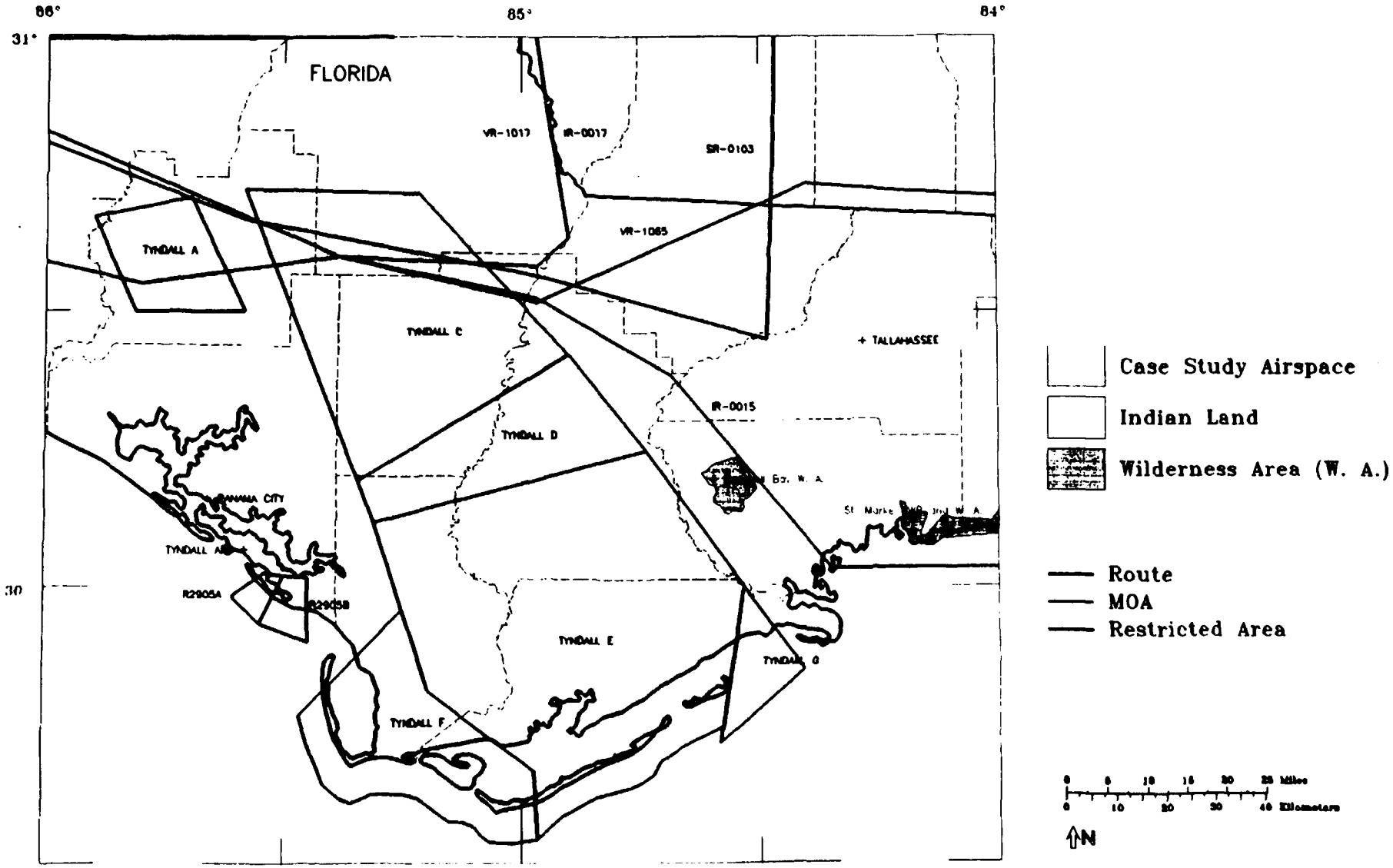
No sovereign American Indian groups are under or near Tyndall MOA (Fig. I.4.1).

I.5 STRUCTURES

I.5.1 Resource Description

Typical structures under the Tyndall MOAs include one and two story frame buildings; one and two story brick buildings (some with external paster walls); mobile homes;

Fig. I.4.1 Federally protected areas in the Tyndall MOA region.



frame barns and outbuildings; and prefabricated metal buildings. The building stock is typical of the rural areas of the coastal southeastern states.

I.5.2 Impact Assessment

The Tyndall MOA use is dominated by small aircraft flying at a minimum of 500 ft AGL. On the basis of work presented in Appendix E, no adverse effects are expected to occur for structures. The number of heavy bombers is far too small to raise a concern.

I.6 WILDERNESS AND PARKS

No national parks or wilderness areas are beneath or near Tyndall MOA (Fig. I.4.1).

I.7 WILDLIFE

I.7.1 Resource Description

The Tyndall MOA is located over near-shore areas of the Gulf of Mexico and in the Atlantic Coastal Plain where the terrain is level to gently rolling. Predominant wildlife habitat of the uplands is longleaf pine/slash pine forest with some oak/hickory forest. Extensive oak-gum-cypress forests occur along the Choctawhatchee, Apalachicola, and Ochlockonee rivers (Eyre 1980). Most coastal islands from Panama City to the Wakulla County line are within the MOA.

Important game animals that occur within the Tyndall MOA include the black bear, gray fox, bobcat, gray and fox squirrels, eastern cottontail, white-tailed deer, bobwhite, several waterfowl species, wild turkey, and mourning dove. The area is not particularly

important for breeding waterfowl and is not used by unusually large numbers of migrating ducks or geese (Bellrose 1976). A Canada goose wintering area is located in the Appalachee Bay area of Wakulla County at the eastern edge of the MOA. Large numbers of wood ducks nest along the Apalachicola River. Other ducks that commonly occur in the area during migration or winter include the mallard, black duck, blue-winged teal, bufflehead, and redhead.

Nesting colonies of mixed wading bird species (e.g., herons, egrets) occur along the lower Apalachicola River basin, Cape San Blas, and on Tyndall AFB. Several nesting colonies of least terns (listed as threatened by the State of Florida) and black skimmers occur on the coastal beaches within the MOA (Montalbano 1989).

Threatened or endangered wildlife that occur in the region underlying the Tyndall MOA are listed in Table I.7.1 based on U.S. Fish and Wildlife Service (USFWS) (1988). The Florida Game and Fresh Water Fish Commission called particular attention to the presence of four active bald eagle nests on St. Vincent Island National Wildlife Refuge (Montalbano 1989).

I.7.2 Impact Assessment

Several threatened (T) or endangered (E) bird species may nest or are known to nest within the Tyndall MOA and could be affected by low altitude flights. Bird species listed by the U.S. FWS are the bald eagle (E), wood stork (E), red-cockaded woodpecker (E), and roseate tern (T). Other rare species that may nest in the MOA are the southeastern snowy plover, southeastern American kestrel, Florida sandhill crane, and least tern. The Florida Game and Fresh Water Fish Commission is concerned in particular about possible impacts to bald eagles nesting on St. Vincent Island and on

Table I.7.1. Threatened and endangered vertebrate species occurring in the Tyndall MOA (excluding aquatic species)

Species	USFWS	Status in Tyndall MOA
American alligator	T(S/A)	Permanent resident
Eastern indigo snake	T	Permanent resident
Ivory-billed woodpecker	E	Probably extirpated
Southeastern snowy plover		Permanent resident
Piping plover	T	Winter resident
Arctic peregrine falcon	T	Winter resident
Southeastern American kestrel		Permanent resident
Florida sandhill crane		Permanent resident
Bald eagle	E	Permanent resident
Wood stork	E	Permanent resident
Red-cockaded woodpecker	E	Permanent resident
Least tern		Summer resident
Roseate tern	T	Summer resident
Gray bat	E	Permanent resident
Indiana bat	E	Winter resident
Choctawhatchee beach mouse	E	Permanent resident
Florida black bear		Permanent resident

Explanation: E = endangered; T = threatened; T(S/A) = threatened due to similarity of appearance. See FGFWFC (1988) for scientific names of the listed species.

nesting colonies of wading birds, least terns, and black skimmers located in several areas; most of the locations of concern are along the coast. Low altitude flights over wading bird nests from February through June and over eagle nests from November through June could adversely affect the reproductive performance of these birds (Montalbano 1989). In view of the presence of and concern over several federal-listed species, nesting shorebirds, and other wildlife, impacts are classified as moderate for both endangered species and other wildlife on this route.

I.8 LIVESTOCK AND POULTRY

I.8.1 Resource Description

Most counties in the region underlying the Tyndall MOA rank relatively low in poultry and livestock production (Table I.8.1). However, Jackson County ranks first among Florida counties in the number of hogs and pigs and is above average in cattle and beef cows. Walton County ranks ninth in hogs and pigs and ranks fifth among Florida counties for the number of layer farms and the number of broilers, and fourth for the number of broiler farms. This high ranking for layers and broilers combined with Florida's national ranking of ninth and eleventh for these two commodities, respectively, indicates the importance of these commodities in Walton County. Only a few square miles of the Tyndall MOA are over Walton County, at the county's eastern border. Few turkeys are raised in the area underlying the Tyndall MOA.

I.8.2 Impact Assessment

In general, the region underlying the Tyndall MOA is not particularly important in the production of livestock and poultry in Florida. An exception is Jackson County, which ranks first among Florida counties in hogs and above average in cattle. Hogs seem to be relatively insensitive to noise. Neither hogs nor cattle should be significantly affected by low altitude flight. Although Walton County is important for poultry, only a few square miles of its land area are under the Tyndall MOA. Impacts are classified as negligible for both livestock and poultry.

Table I.8.1. Livestock and poultry rankings related to the Tyndall MOA in Florida

Commodity	National	Leading counties
Layers[a]	9	Hillsborough, Pasco, Bradford, Suwannee, Sumter, Union, Madison
Layer farms		Hillsborough, Suwannee, Pasco, Escambia, Walton, Palm Beach, Holmes, Dade, Duvall, Madison
Broilers[b]	11	Suwannee, Lafayette, Holmes, Madison, Walton, Baker, Bradford, Clay
Broiler farms		Suwannee, Lafayette, Holmes, Walton, Madison, Baker, Bradford, Clay
Milk production	19	Okeechobee (far above others), Hillsborough, Highlands, Lafayette, Nassau
		Rank of Counties within Tyndall MOA[c]
Turkeys	<30	[Bay, Franklin, Gulf, Jackson, Wakulla, Walton, and Washington each had less than 150 turkeys; data unavailable for other counties]
Cattle and calves	16	Bay (65), Calhoun (60), Franklin (67), Gulf (61), Jackson (19), Liberty (63), Wakulla (64), Walton (39), Washington (44)
Beef cows	8	Gulf (47), Jackson (18), Liberty (48), Wakulla (49), Walton (34), Washington (35)
Hogs and pigs	30	Bay (47), Calhoun (27), Jackson (1), Liberty (60), Wakulla (26), Walton (9), Washington (18)

[a]Statistics were withheld for Walton and 9 other counties to avoid disclosing data for individual farms.

[b]Statistics were withheld for Bay, Wakulla, Washington, and other counties.

[c]Leading counties were unavailable for cattle and calves, beef cows, turkeys, and hogs and pigs.

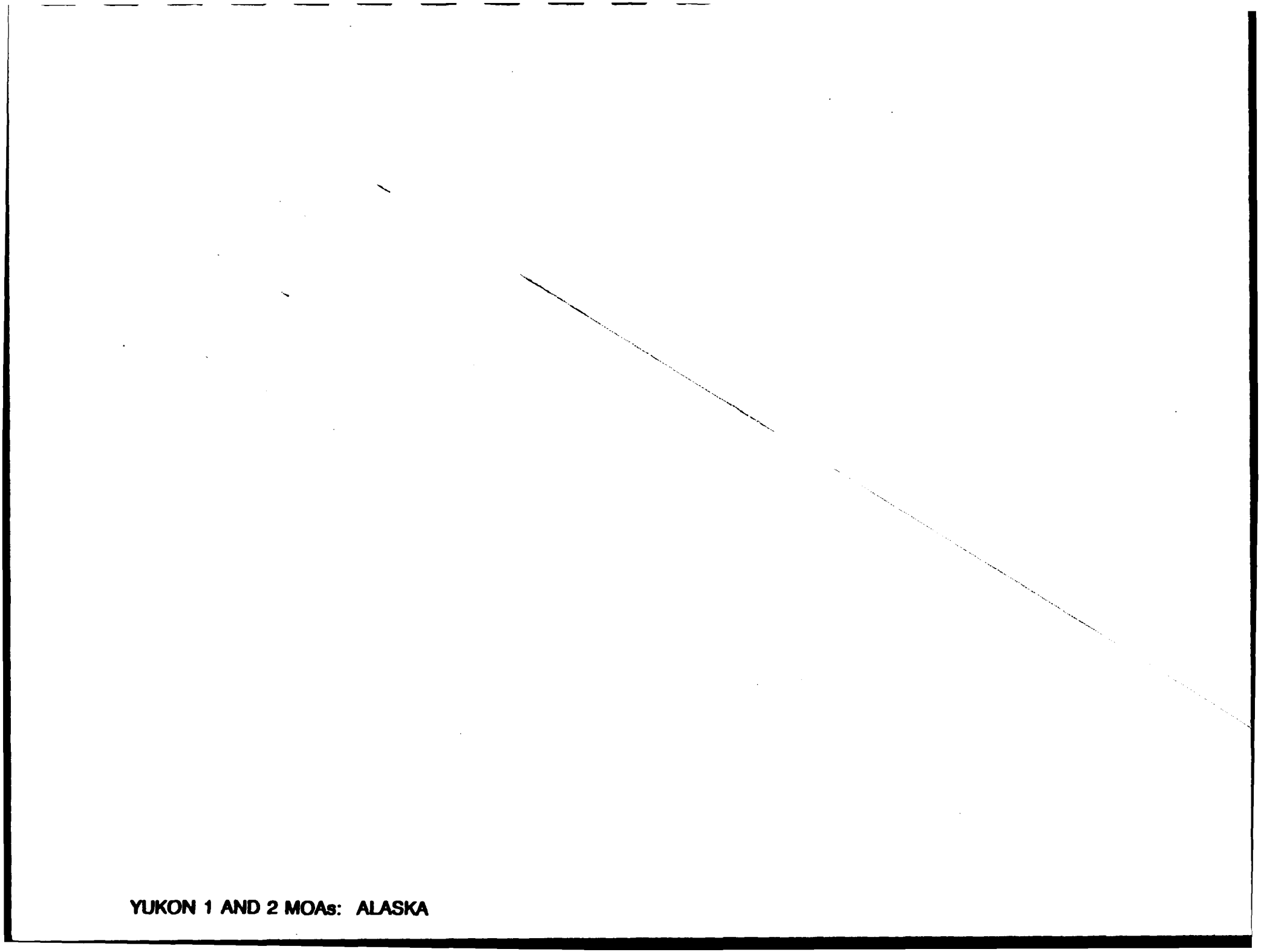
I.9 AIR QUALITY

I.9.1 Resource Description

There are no designated NAAQS non-attainment areas in the counties beneath the Tyndall MOAs (EPA 1989). However, there are two PSD Class I areas, the Bradwell Bay and St. Marks Wilderness Areas, each approximately 3 miles east of the eastern boundary of the Tyndall MOA complex.

I.9.2 Impact Assessment

The air quality impacts analysis for the Tyndall MOAs indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be far below levels of concern for areas under the MOA. The maximum predicted incremental concentrations for this MOA were less than 5% of the NAAQS and PSD Class II increments, which are applicable in the Tyndall MOAs and less than 5% of PSD Class I increments, which are applicable in two PSD Class I areas, the Bradwell Bay and Saint Marks Wilderness Areas, approximately 3 miles east of the Tyndall MOAs. Thus, the air quality impacts of the Tyndall MOAs are considered to be negligible (Table 4.1.9).



YUKON 1 AND 2 MOAs: ALASKA

J. YUKON 1 AND 2 MOAs (ALASKA)

J.1 AIRSPACE

The Alaskan Air Command's Yukon 1 and Yukon 2 MOAs, established November 1, 1975, are located northeast of Fairbanks in eastern Alaska (Fig. J.1.1). The Yukon MOAs are scheduled by the 343rd Tactical Fighter Wing at Eielson AFB, Alaska. The Yukon 1 MOA is located over three boroughs in Alaska while the Yukon 2 MOA is located over two.

Yukon 1, the more southerly of the two MOAs, is over the Mertie Mountains, a low mountain range north of Fairbanks. The southern portion of Yukon 2 is also over the Mertie Mountains, but the terrain becomes a very flat plain in the northern part and is subject to shallow flooding part of the year. Visibility of aircraft from the ground improves as one moves northward through the two Yukon MOAs.

The Yukon MOAs were established to provide training for AAC aircrews at altitudes from ground level for Yukon 1 and 100 ft AGL for Yukon 2 to 1800 ft MSL. However, the minimum altitude in much of the northern portion of Yukon 2 MOA above the towns of Circle, Circle Hot Springs, and Central is 2000 ft AGL. The Yukon 1 MOA has an area of 3,840 sq. miles, and the Yukon 2 MOA covers 5,159 sq. miles. The Air Force is permitted to schedule flying in the MOAs between 7:00 a.m. and 5:00 p.m., Monday through Friday.

Both Yukon 1 and 2 MOAs are available for scheduling from 8:00 a.m. to 6:00 p.m. 5 days a week (Monday through Friday). The Air Force typically schedules operations for about half the time the MOAs are available each day. The 343rd TFW currently

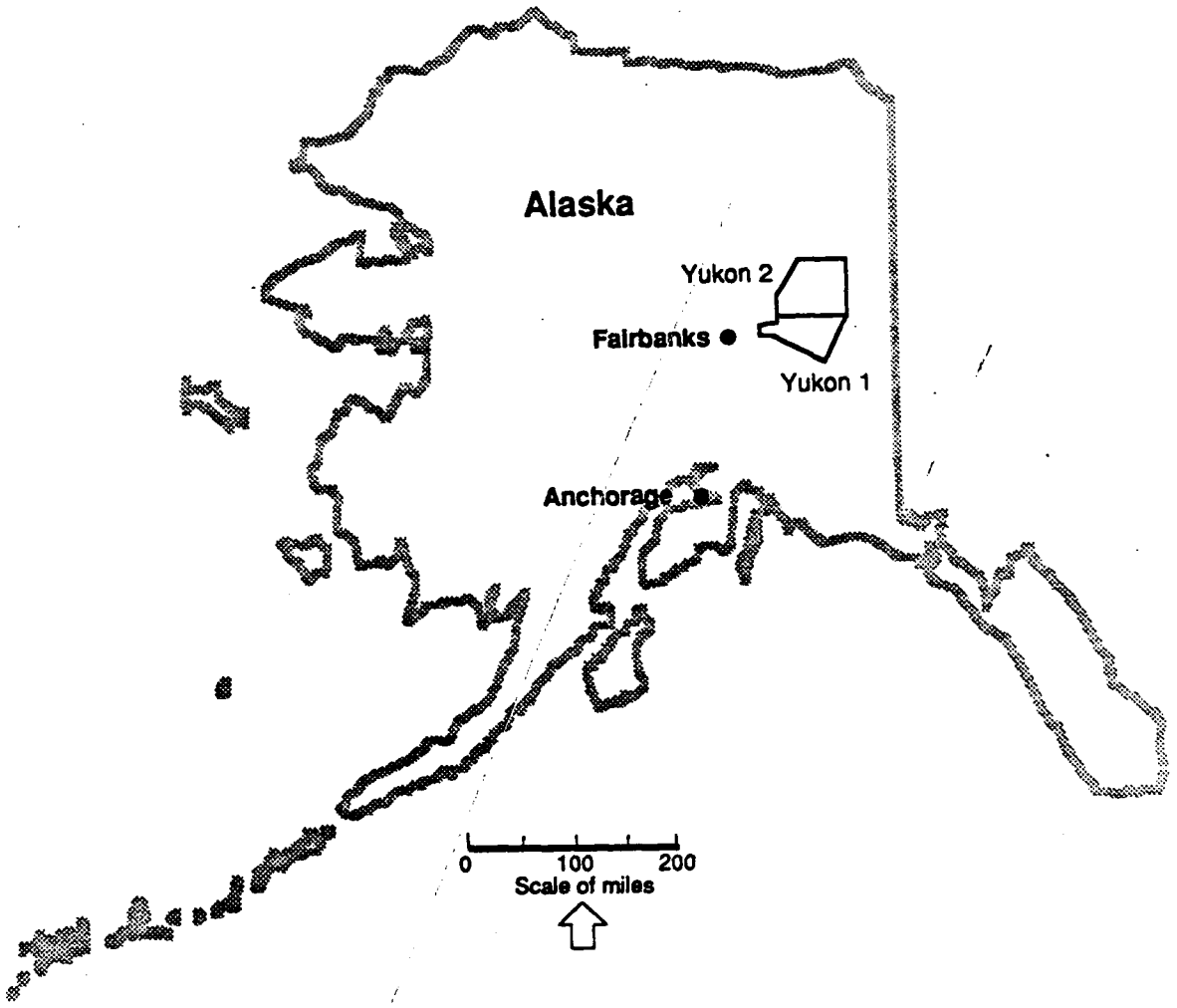


Fig. J.1.1. Map of Yukon MOA region.

schedules the Yukon MOAs for low altitude training, and in an average month in 1986, the scheduled aircraft sorties were as follows:

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
	Yukon 1		
A-10	700	300-500	340
T-33	12	500-1000	400
O-2	10	300-500	170
F-16	5	500-1000	520
C-130	2	500-1000	250
Total	729		
	Yukon 2		
F-16	13	500-1000	520
T-33	12	500-1000	400
O-2	11	300-500	170
F-15	7	500-3000	550
C-130	2	500-1000	250
Total	45		

The flights are spread across the entire area, although they are concentrated in the upper middle section of the Yukon 1 MOA.

The Yukon 1 MOA contains Restricted Area R-2205 and is crossed by three MTRs, including VR-1909 and VR-1910. These routes are scheduled by the 21st Tactical Fighter Wing (AAC) at Elmendorf AFB, Alaska, and each had two T-33 sorties scheduled on it in the average month in 1986. Two MTRs cross Yukon 2, of which VR-1910 is the busiest with two T-33 sorties scheduled per month in 1986.

J.2 SOCIAL

J.2.1 Resource Description

There were approximately 156 people living beneath the Yukon 2 MOA in 1980, and there were no permanent residents beneath Yukon 1. The average population density beneath both Yukon MOAs was approximately 0.02 person/sq. miles; the average population density beneath Yukon 2 was 0.03 person/sq. miles. In comparison, the 1980 Alaskan population density was approximately 0.7 people/sq. miles and that of the United States was 64.0 people/sq. miles. Figure J.2.2 depicts population distribution under the Yukon MOA. There are 3 towns beneath the Yukon 2 MOA: Circle (population 81), Central (36), and Circle Hot Springs (30).

J.2.2 Impact Assessment

Forty-one face-to-face interviews were conducted under Yukon MOA. In addition, nine key informant interviews with local officials and newspaper editors were conducted by telephone. Of necessity, most of the key informant interviews were held with people in Fairbanks, over 100 miles away from the towns located under Yukon MOA. This situation is different from the other case study airspaces. Analyses of interview data indicate that the social impacts of low altitude flying activities under Yukon MOA are moderate. Both annoyance and activity disruption are moderate. The impact of flights with regard to community disruption are low and there are negligible impacts on young children in group facilities and on the economics of livestock productivity.

Fig. J.2.2 Population distribution in the Yukon MOA region.

J.2.2.1 *Awareness*

While most face-to-face interview respondents (36, or 90.0%) were aware of low altitude military flights, fewer local officials and newspaper editors (6, or 66.7%) were aware of flights in the area.

J.2.2.2 *Annoyance*

Annoyance impacts are moderate since one-quarter (10) respondents were highly annoyed with at least one aspect of the flights. Seven (17.5%) were highly annoyed by the possibility of an aircraft accident, 5 (12.5%) by the altitude of the flights, 3 (7.5%) by aircraft noise, and 2 (5%) by the presence of the flights.

The majority of the respondents (24, or 60%) reported low annoyance with the low altitude flights on all four annoyance variables. Thirty-four (85%) reported low annoyance with the presence of the flights, 30 (75%) with the altitude and with aircraft noise, and 29 (72.5%) with the possibility of an aircraft accident.

J.2.2.3 *Interrupted activities*

Activity disruption constitutes a moderate impacts. Eight respondents (20%) reported sleep interruption or interruption of three or more non-sleep activities during the previous month. Six (15%) reported sleep interruption. Three respondents (7.5%) reported the interruption of four non-sleep activities and one respondent (2.5%) reported interruption each of five and six non-sleep activities. On the other end of the scale, 28 respondents (70%) reported no interruption of non-sleep activities, 6 (15%)

reported the disruption of one non-sleep activity, and 1 reported the interruption of two such activities.

J.2.2.4 *Community disruption*

Community disruption was low. One (11.1%) of the local officials and newspaper editors was aware of community disruption resulting from the flights.

J.2.2.5 *Disturbance of young in group facilities*

Disturbance of the very young in group facilities beneath the Yukon MOA was negligible. None of the key informants received complaints regarding young children in group facilities. Also, disturbance of children was not mentioned by survey respondents as a negative aspect of flights.

J.2.2.6 *Reduced livestock productivity*

None of the local officials and newspaper editors were aware of reported losses in productivity from commercial livestock operations beneath the Yukon MOA. Impacts are apparently negligible. However, five survey respondents said that the flights disturb their domestic animals. Under Yukon MOA, these animals are likely to be dogs.

J.2.2.7 *Impact indicators*

Two respondents (5.7%) previously had made one or two formal complaints about the Air Force's low altitude flights. Seven respondents (18.5%) reported making informal complaints to friends or family. Two of these had complained more than once a month,

and 5 had complained three times a year or less. In addition, 22.2% of the local officials and newspapers had received complaints about the flights.

A minority of respondents (5 or 13.9%) beneath the Yukon MOA either were opposed or strongly opposed to the flights. Twelve (33.3%) neither opposed nor supported the flights, and 18 (50%) either supported or strongly supported these activities.

J.3 NOISE

J.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP the L_{dnmr} for Yukon 1 is 53.5 dB at the center of the MOA and 53 dB 3 miles from the center (Fig. J.3.1). For Yukon 2 the L_{dnmr} is 50 dB at the center of the MOA and 50 dB 3 miles from the center (Fig. J.3.2). Planes are restricted to a minimum altitude of 2000 ft AGL over the three communities in the northern portion of Yukon 2, resulting in a noise level of no more than 50 dB in the only populated area in the MOA. Beneath the area where VR-1909 and VR-1910 cross the Yukon MOA, the L_{dnmr} at centerline is 55.5 dB and 54.8 dB 3 miles from the routes' centerline. Thus, in all cases, the calculated noise levels for the Yukon MOAs are little more than ambient noise levels.

The maximum SEL for Yukon 1 is 108.2 dB at the center of the MOA and 65.6 dB 3 miles from the MOAs center. The SEL maximum for Yukon 2 is 114.1 dB at the center of the MOA and 71.5 dB 3 miles from the MOAs center. Beneath the area where

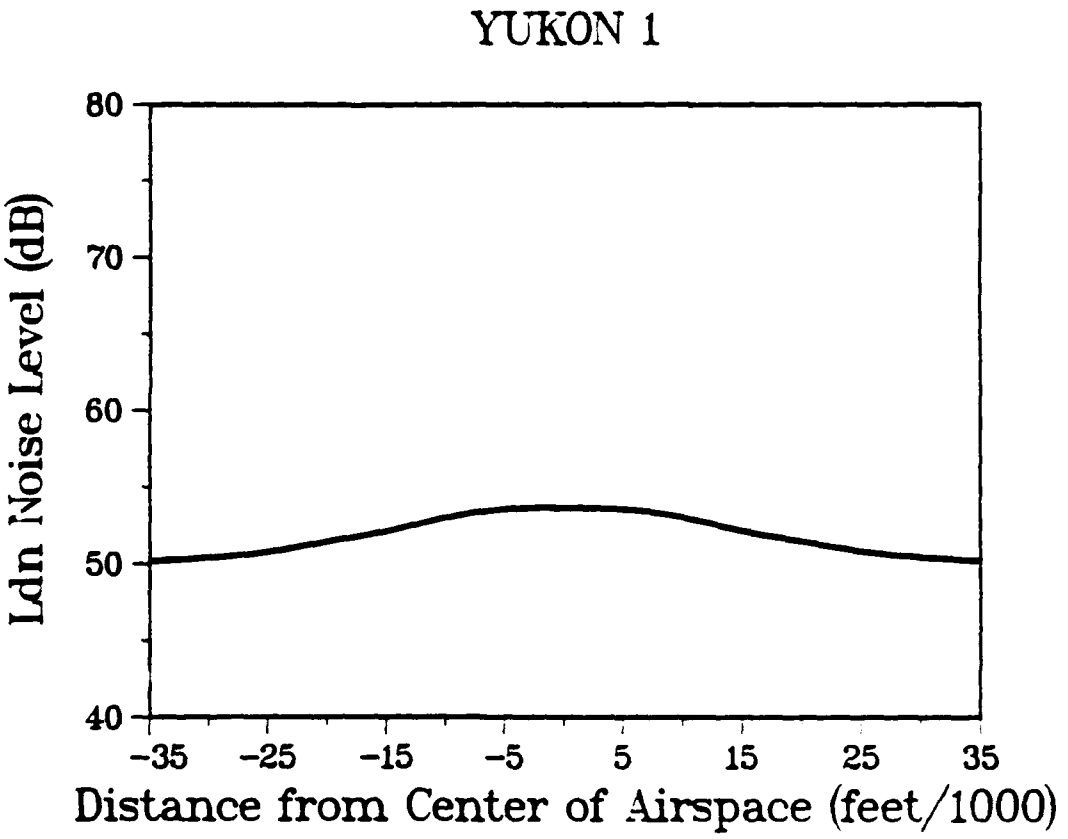


Fig. J.3.1. L_{dnmr} levels for Yukon 1 MOA.

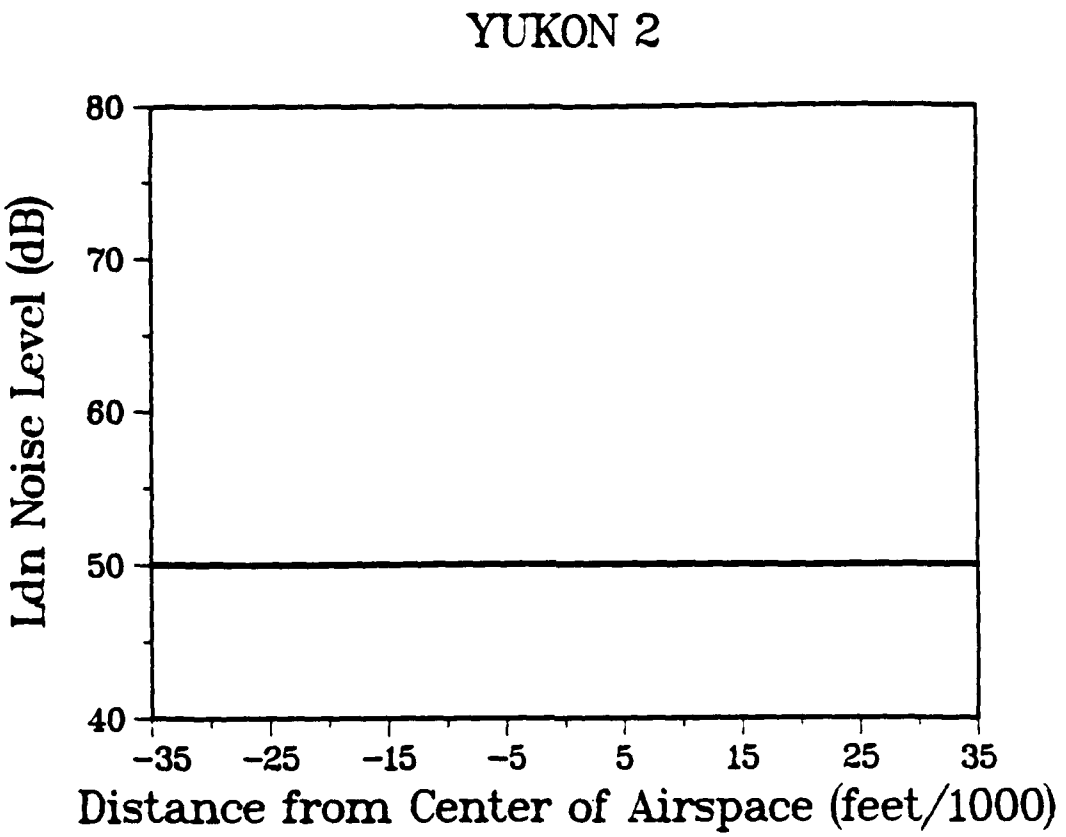


Fig. J.3.2. L_{dnmr} levels for Yukon 2 MOA.

VR-1910 crosses Yukon 1 the maximum SEL is 108.2 dB at centerline and 65.6 dB 3 miles from centerline.

Beneath the area where VR-1910 crosses Yukon 2 the maximum SEL is 114.1 dB at centerline and 71.5 dB 3 miles from centerline.

J.3.2 Impact Assessment

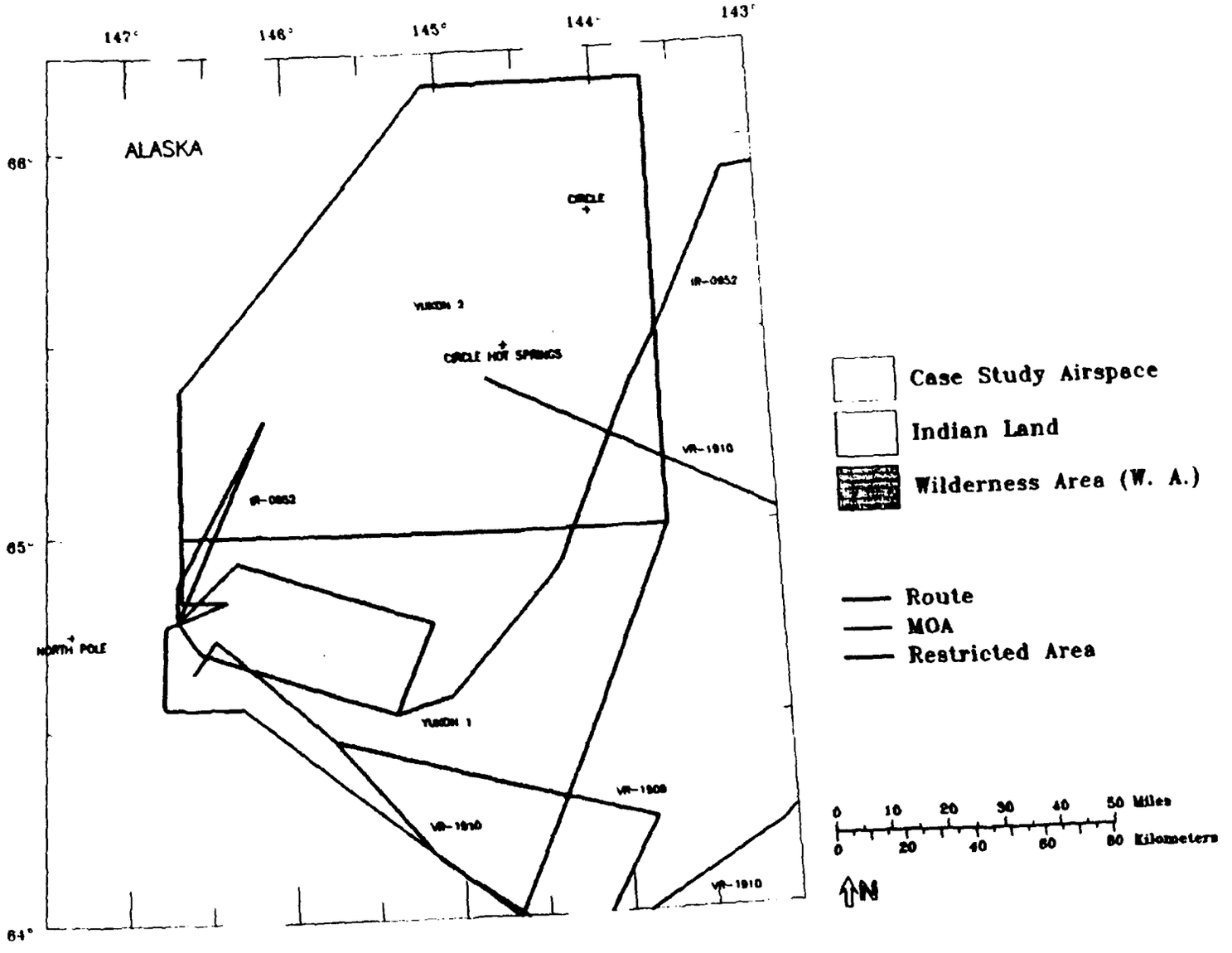
The Yukon 1 and 2 MOAs are exposed to very little aircraft noise above ambient levels when averaged over a month's time. Noise levels of 53 and 54 dB, are calculated for these airspaces. These levels of noise are associated with about 2 to 3% of the persons overflown being highly annoyed. A noise level of 50 dB is calculated for communities in Yukon 2, the only MOA with permanent inhabitants. No community reaction is anticipated. Beyond the small numbers of persons highly annoyed, no health issues present themselves. The noise levels are well below those required to add to a noise induced stress risk. Therefore, the significance factor for human health considerations is that of negligible.

J.4 AMERICAN INDIANS

J.4.1 Resource Description

The Athabascan Native village of Circle is located within the Yukon 2 MOA (Fig. J.4.1). The official population of Circle is 81, consisting of about 90% Native residents. The Alaska Natives in Circle are one of nine geographically defined subunits of Kutchin Natives, the Yukon Flats or Kutcha Kutchin (pronounced Gwich'in, meaning "those who dwell here").

Fig. J.4.1 Federally protected areas in the Yukon MOA region.



Subsistence activities consist primarily of limited hunting and trapping (for lower value furbearers such as muskrat and beaver) in the spring; hunting in the fall and winter; fishing, gathering and some gardening in the summer; and a staging, or preparation period during the fall. Trapping, conducted primarily during the winter, is an important but highly unstable source of monetary income for Circle residents.

The economic base in Circle is narrow, with few jobs other than transitory seasonal positions and a small core of public sector jobs associated with administrative and service organizations such as the school. The private sector constitutes a very small part of the economy.

There is also a local village corporation which functions primarily to use assets derived from the Alaska Native Claims Settlement Act (ANCSA) of 1971 to generate profits for its shareholders. Most Circle Native residents also hold shares in the regional ANCSA profit-making corporation, Doyon Ltd.

The Tanana Chief's Conference, the non-profit corporation established as a social service counterpart to Doyon, provides employment referral services, social and health services, training programs, day care assistance, public safety services, and energy conservation and home improvement assistance, as well as technical assistance in obtaining funding for the development of other infrastructure.

The village is governed by a local Traditional Council, presided over by the Village Chief, who is elected from the Native members of the village. The village is part of the unorganized borough—not an incorporated city—and so receives support and protection directly from state offices.

J.4.2 Impact Assessment

Within the Guich'in village of Circle there were no complaints about the effects of low altitude Air Force overflights. Air Force planes are restricted to flying at altitudes above 2000 ft AGL over the village. The Guich'in maintained that flights directly over the village or cabins probably resulted from pilots departing from their flight paths out of curiosity. Possible nuisances to hunting or other daily activities were attributed as much to private aircraft as to military aircraft. Comparisons of Circle Guich'in (i.e., Athabascans) with Guich'in and Inuit (Eskimo) villages elsewhere in Alaska indicated (1) the low likelihood of severe impacts to subsistence arising from the disruption of caribou herd migration and waterfowl staging; (2) the high likelihood of aggravated threats to native village council authority brought about by legislated changes in land status; and (3) remotely possible disruption of ceremonial potlatch activities. A more detailed discussion of these issues appears in Appendix F.

On the positive side, Circle villagers maintained that Alaska's proximity to the Soviet Union necessitated pilot training for national defense. The overflights were considered a diversion, particularly during school, when students would sometimes leave the classroom to watch. Still others maintained that military aircraft might conceivably be of help by locating hunters stranded in the wilderness.

Village council legitimacy (sovereignty) is the most serious issue, because of the uncertain land status. The only other serious effect pertains to wildlife disruption and these are easily reversible by planning flight schedules with state and federal officials. The impact, overall, is low.

J.5 STRUCTURES

J.5.1 Resource Description

Typical structures under the Yukon 1 and 2 MOAs include one and two story frame buildings, one and two story log structures, and camp trailers. The building stock is typical of rural Alaskan communities.

J.5.2 Impact Assessment

Most of the aircraft flown in Yukon 1 and 2 are considered to be light, with no real potential for producing structural damage at present altitudes. The few heavy aircraft flights are far too infrequent to be of concern for structural damage. Based on GEIS findings (Appendix E), it is unlikely that any noticeable damage to typical structures in the area, including cracked walls or foundations or broken windows, could be expected to result from the Air Force's current low altitude flying operations.

J.6 WILDERNESS AND PARKS

J.6.1 Resource Description

The following are located either partly or entirely within the Yukon 1 and 2 MOAs:

Yukon Flats National Wildlife Refuge
Yukon-Charley Rivers National Preserve
White Mountain NRA (BLM)
Steese National Conservation Area (BLM)
Birch Creek National Wild River (BLM)
Charley National Wild River

Access to these wilderness and wildlife refuges is achieved primarily through: (1) a graded gravel road leading from Fairbanks to the Athabascan village of Circle, at the shores of the Yukon River; (2) snowmobile travel from Circle; (3) boat, on the Yukon River in the summer and fall; and (4) airplanes using the landing strip at Circle. Lodging is available primarily at Circle Hot Springs, approximately 30 miles southwest of Circle. In general, hiking, snowmobiling, hunting, fishing, bird watching, boating and some cross-country skiing are practiced in these areas.

While the 1964 Wilderness Act is applicable to these lands, their regulation also falls under the Alaska Native Claims Settlement Act and the Alaska National and Indian Land Claims Act. Thus, subsistence hunting, trapping, mining, and air access are permitted for Alaskan Wilderness Areas. Nevertheless, as part of the "last frontier" of Alaska, these lands are especially valued by wilderness preservation advocates because they are uniquely more isolated than are similar lands in the coterminous U.S. from the commercial and industrial activities competing for land use.

J.6.2 Impact Assessment

In assessing impacts to these resources, interviews were conducted with officials or members of the U.S. Fish and Wildlife Service, the National Park Service, the Bureau of Land Management, The Wilderness Society, and The Sierra Club. It was also possible to interview wilderness users in the area as well as in Fairbanks.

Positive impacts included the contribution of these low altitude flying operations to the nation's defense. Residents were sensitive to Alaska's proximity to the Soviet Union and, therefore, considered the training purpose of these flights important. Others mentioned the possibility that the Air Force could assist in spotting forest fires, which had raged throughout Alaska and the United States during the summer of 1988.

Adverse impacts to those people living close to the MOA were relatively minor. Flying altitudes in the three communities under the MOA are restricted to 2,000 ft AGL. The flights occur infrequently and only rarely were people overflown at low altitudes or directly overhead. Others living in Fairbanks and Anchorage, however, were more sensitive about the disruption of their solitude while in the wilderness, especially when their intent was to get away from civilization.

Threats to the safety of hikers, climbers and skiers due to startling and avalanche dangers were cited by several people. No such incidents had been recorded from military planes, but concern was expressed that it could happen if the frequency of low altitude flights increased.

Another concern cited was the extreme annoyance to wilderness advocates regarding the intrusion of any planes in a wilderness area. They were concerned with the degradation of any designated wilderness area which results from low altitude flights; however, they were particularly concerned about degradation of Alaskan wilderness, which residents, wilderness users, and park service people described as the last of the last frontiers.

It was noted that low altitude flights interfered dangerously with state and federal fish and wildlife, as well as National Park service planes, which also conducted low altitude flights. Several close calls were cited. Failure by the Air Force to meet on a regular and timely basis with these officials resulted in an inability to rectify some otherwise minor problems.

In general, the severity of impacts on recreational solitude is low to moderate due to infrequent interruptions that affect intensely a small number of people who seek out uniquely pristine country. The impact on the user definition of wilderness is far more

severe, specifically in the designated wilderness of the Yukon-Charley National Preserve. Though the impact on wildlife is not yet determined, it appears that the impact on the users' enjoyment of wildlife at present is low. Caretaker's ability to perform routine activities is affected moderately.

Rural residents near these areas reported that they are less concerned than are urban recreational users about impacts to wilderness character because of the infrequency of flights and easy access to the areas. Officials expressed greater concern about wildlife enjoyment for areas such as the Yukon Charley Preserve, which is a critical nesting and staging area for waterfowl and other wildlife. Impacts involving interference with caretaker activities intensify in areas where planes are used for patrolling large expanses of wilderness area for wildlife and user safety monitoring, and could intensity still more if consultation is improperly maintained.

J.7 WILDLIFE

J.7.1 Resource Description

The biotic environment for the Yukon MOAs is described in USAF (1986), NPS (1985) and USFWS (1987). The following summary is based primarily on information in these documents.

The Yukon MOA area is part of the North American taiga, consisting of tundra (above timberline), coniferous forest, and several widespread deciduous species. Coniferous and deciduous forest, alpine and deciduous scrub, shrub tundra, and graminoid marsh (USFWS 1987) cover the Yukon Flats National Wildlife Refuge in the northeastern portion of Yukon 2 MOA. Similarly, vegetation communities of the Yukon-Charley Rivers National Preserve are described as upland spruce/hardwood forest, bottomland

spruce/poplar forest, shrubland, tundra, and muskeg (NPS 1985). Common tree species of forested areas include black and white spruce, white and paper birch, quaking aspen, and balsam poplar. Common shrub species (above and below timberline) are alder, willow, glandular birch, blueberry, prickly rose, cranberry, and leatherleaf. Herbaceous plants such as sedges, cottongrass, and horsetails are found in tundra or on margins of ponds and lakes. South-facing slopes often support sagebrush.

There are low densities of Dall sheep in mountainous areas throughout the MOAs. Two prime areas straddle the Yukon 1/Yukon 2 MOA boundary in the Salcha-Chena headwaters and the southeastern border of the MOAs. Approximately 275 Dall sheep are estimated in the Yukon-Charley Rivers National Preserve.

Major drainages throughout the MOAs support moose in low to moderate densities. The highest densities (0.75/sq. mi) occur along the Salcha and Chena drainages. Important winter range is along many waterways (e.g., Yukon River, Birch Creek) and calving areas include Shaw Creek Flats and the Salcha River.

The southern two-thirds of the MOAs is habitat for at least 14,000 caribou. This entire area is suitable winter habitat, but most of the animals move toward the southeast in the fall and return in the spring. Calving locations are variable but roughly the central third of the habitat area can be considered as calving grounds.

Brown (grizzly) bears occur throughout the MOAs, particularly in the mountainous areas of the central portion. Spring concentrations occur along the Charley River on the eastern border. Black bears are associated with several drainages in the MOA. Wolves occur throughout the MOAs, with a relatively low population in the north (approximately 45 animals reported for Yukon Flats Refuge) and an increasing population in the south.

Nesting locations have been recorded along the Yukon and Charley rivers for bald eagles, red-tailed hawks, kestrels, goshawks, and sharp-shinned hawks. A variety of other raptors have been noted. Golden eagles and gyrfalcons nest in the adjacent uplands. The Yukon river is also an important migration corridor for many waterfowl species. Breeding swans and other waterfowl are mainly restricted to the Yukon Flats area in the northern quarter of the MOAs. Yukon Flats Refuge is one of the best waterfowl production areas in North America. Both trumpeter and tundra swans breed on the flats. Over a million diving (e.g., scaup, canvasback, and bufflehead) and dabbling (e.g., wigeon, shoveler, and pintail) ducks, 10,000 Canada and white-fronted geese, and 11,000 sandhill cranes use the Yukon Flats area for nesting, molting, and staging. Snow geese use the area during spring migration.

Other important game animals and furbearers include marten, lynx, snowshoe hare, beaver, muskrat, red fox, and wolverine. Game birds include spruce, sharp-tailed, and ruffed grouse, and rock and willow ptarmigan.

The bald and golden eagles, grizzly bear, and wolf are not considered endangered in Alaska. The only listed endangered species is the peregrine falcon, and the MOAs (Yukon, Salcha, and Charley drainages) contain some of the best nesting habitat in the state, supporting about 28 eyries.

J.7.2 Impact Assessment

A number of wildlife species in the Yukon MOAs have been observed to exhibit panic responses in the presence of low altitude aircraft flights (USAF 1986). These include, in order of apparent sensitivity, bear, Dall sheep, caribou, and moose. Waterfowl, and especially raptors exhibit highly variable responses. There are no data, however, to

establish the frequency of such responses nor the extent of adverse effects (e.g., injury or reproductive impairment). Moreover, there are no data to indicate the extent to which any such effects would lead to population declines. The caribou herd in the Yukon MOA, for example, has been increasing in the presence of existing low altitude flying operations (USAF 1986). Although this observation of the net condition does not establish the absence of an adverse population effect from low altitude flights, it does lessen the concern over any such effects. Similarly, there is no evidence that the incidence of bird collisions with aircraft poses a significant hazard to populations.

The combination of large numbers of various wildlife and the uncertainty about effects of flights make evaluation difficult for this MOA. In the face of this uncertainty, the Alaska Department of Fish and Game has expressed concern over the following issues: caribou calving, raptor nesting and breeding, peregrine falcon nesting, trumpeter swan rearing and staging areas, and waterfowl nesting and staging areas (Collingsworth 1987; Carson 1987).

In view of the considerable uncertainty and the degree of agency concern, impacts to wildlife are considered moderate.

J.8 LIVESTOCK AND POULTRY

J.8.1 Resource Description

Alaska ranks at or near the bottom among the states on all measures of livestock and poultry production (USDA 1987). Of the counties under the MOA, only Fairbanks Northstar is among those reporting agricultural statistics (ORNL 1989). Fairbanks Northstar has between about 20 to 30% of the totals in cattle and sheep, in terms of both number of farms and number of animals among reporting counties. Hogs and

poultry (chickens and turkeys) account for up to 50% of the state totals. No mink are reported for the state.

J.8.2 Impact Assessment

Agricultural activity is very low in Alaska, and negligible impacts for both livestock and poultry are expected from aircraft overflights. State agricultural officials have expressed no concerns. As noted in Sect. J.2.2, no local officials were aware of any reported losses to livestock operators.

J.9 AIR QUALITY

J.9.1 Resource Description

There are no designated NAAQS non-attainment areas in the counties beneath Yukon MOAs 1 and 2 (EPA 1989). There are no PSD Class I areas within 6 miles of these MOAs.

J.9.2 Impact Assessment

The air quality impact analysis for the Yukon 1 and 2 MOAs indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be far below levels of concern for the area. The maximum predicted incremental concentrations for the Yukon MOAs were less than 5% of the NAAQS and PSD Class II increments, which are applicable in the areas overflown. Thus, the air quality impacts of the Yukon 1 and 2 MOAs are considered to be negligible (Table 4.1.9).

K. R-6002 (SOUTH CAROLINA)

K.1 AIRSPACE

The Tactical Air Command's Restricted Area R-6002, established on April 1, 1974, is located between Georgetown and Florence over Sumter County in the eastern part of South Carolina (Fig. K.1.1). R-6002 is scheduled by the 363rd Tactical Fighter Wing at Shaw AFB.

The area beneath R-6002 is located in the Coastal Plains region of the United States and is very flat. Parts of the region are swamp-like, and much of it has trees and other cover which can restrict visibility despite the level terrain. Open land is generally used for agriculture and has good visibility.

R-6002 was developed for training TAC aircrews between the earth's surface and 1,300 ft MSL and covers an area of 69 sq. mile. It was set up to facilitate operation of the Poinsett range. It is available for Air Force use between 8:00 a.m. and 10:00 p.m., Monday through Friday, and from noon to 10:00 p.m. on Saturdays.

R-6002 is available for scheduling from 8:00 a.m. to 10:00 p.m. local time, Monday through Friday, and from noon to 10:00 p.m. on Saturdays. The Air Force generally schedules and uses the RA for about 12 hrs each weekday but rarely uses it on Saturdays. There are no other MTRs, MOAs, or RAs which cross or are concurrent with R-6002, since the airspace was established to exclude other military or civilian flight operations. It was scheduled by the 363rd TFW for the following average number of flights each month in 1986.

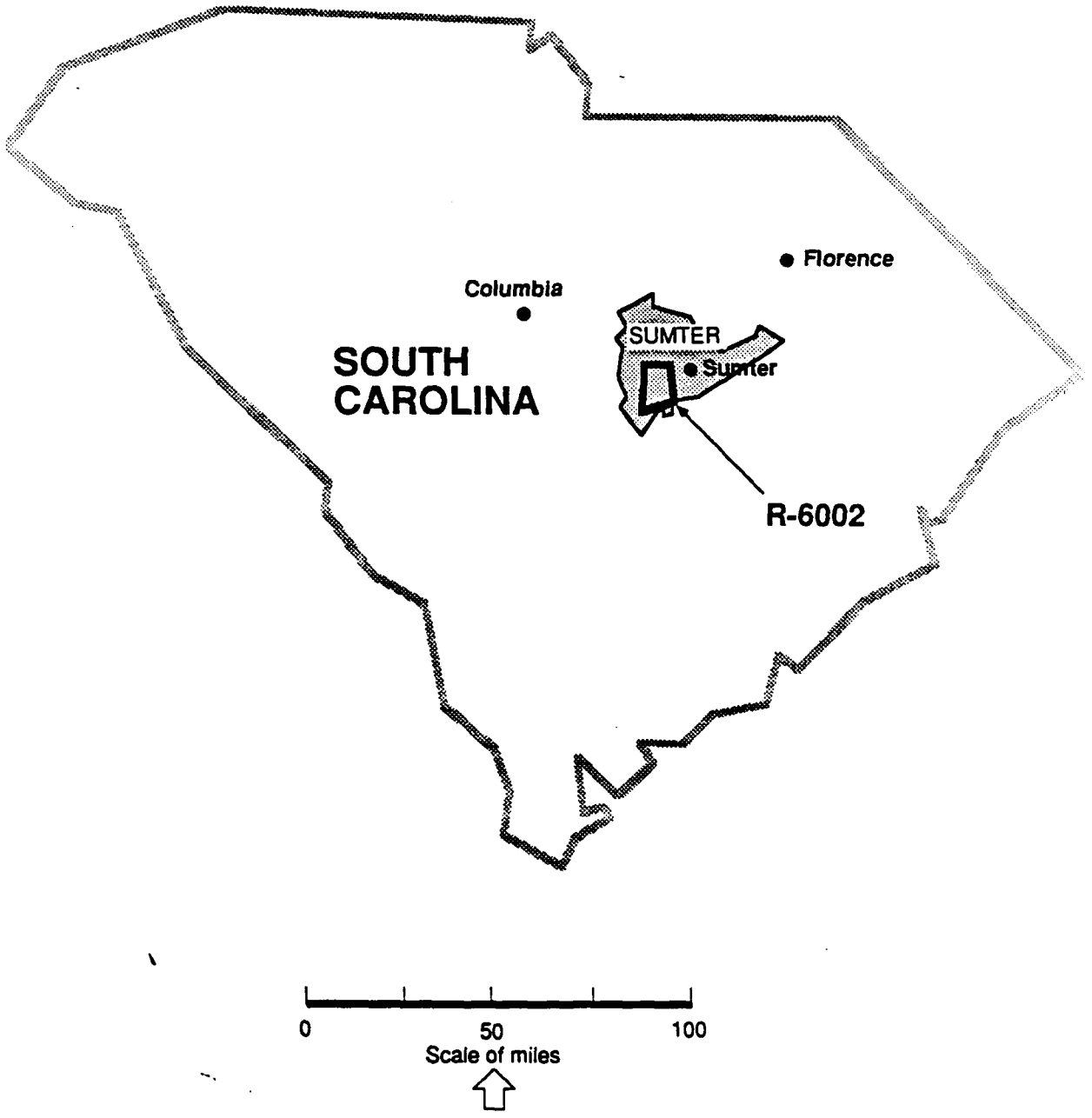


Fig. K.1.1. Map of R-6002.

Aircraft type	Average scheduled monthly sorties	Typical altitude (ft AGL)	Typical speed (mph)
A-10	483	300	340
F-16	407	500	400
O-2	140	300	150
RF-4	53	500	400
Total	1083		

K.2 SOCIAL

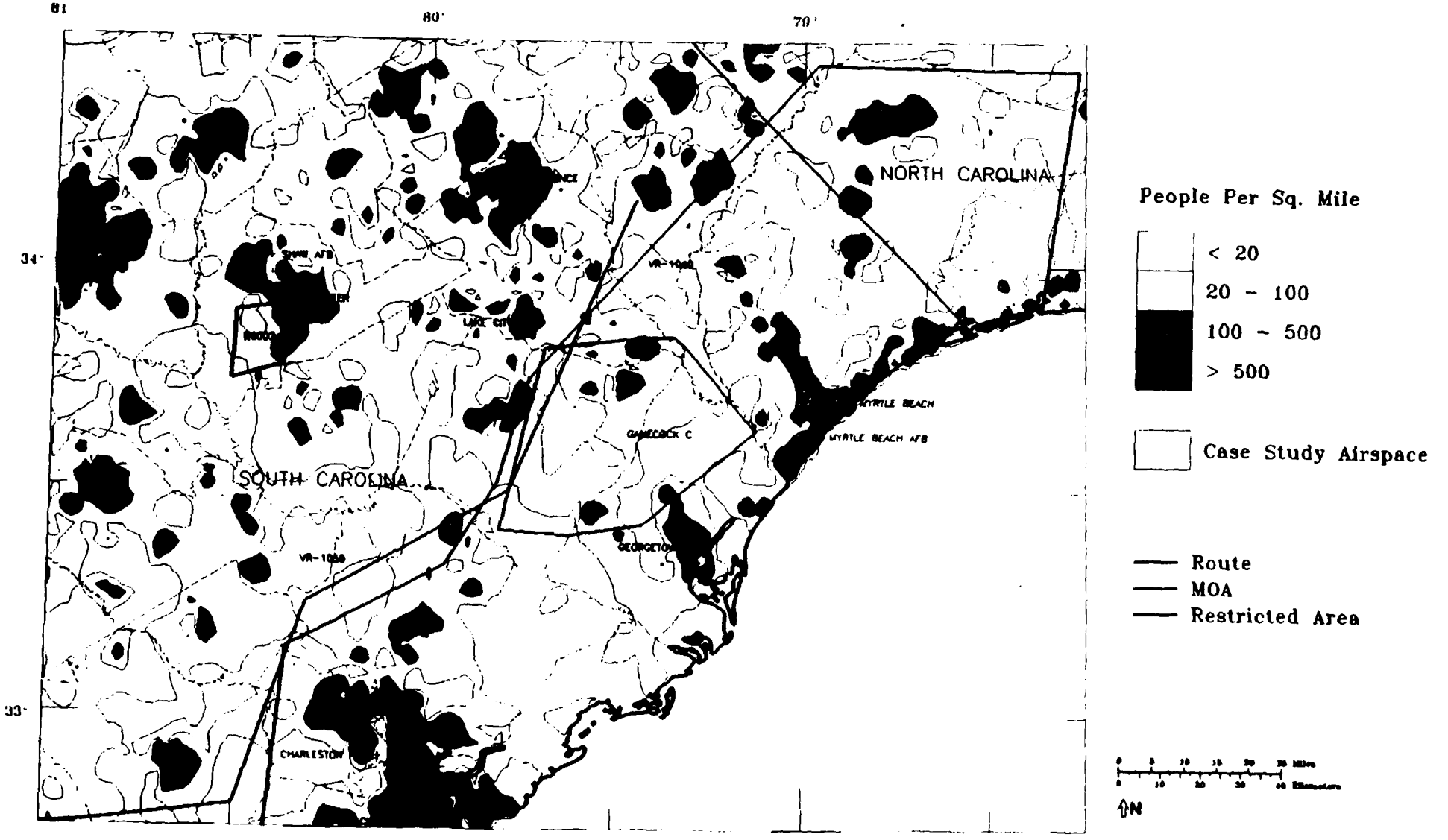
K.2.1 Resource Description

About 4,400 people lived beneath R-6002 in Sumter County, South Carolina in 1980. The average population density beneath R-6002 was approximately 63.5 persons/ sq. miles. There are no towns beneath R-6002. In comparison, the 1980 population density of South Carolina was 103.4 people/sq. miles and that of the United States was 64.0 people/sq. miles. Figure K.2.2 portrays population distribution under R-6002.

K.2.2 Impact Assessment

Twelve face-to-face interviews were conducted beneath R-6002. Thirteen telephone interviews were conducted with key informants both for the case study of Gamecock C MOA and R-6002 since the two airspaces are located near one another. Results of key informant interviews are presented for both sites. Analyses of interview data indicate that social impacts of flights under R-6002 are moderate. Both annoyance and interrupted activities constitute moderate impacts. However, impact levels in the other three impact categories are negligible.

Fig. K.2.2 Population distribution in the R-6002 region.



K.2.2.1 *Awareness*

All 12 (100%) of the respondents surveyed beneath R-6002 were aware of low altitude military flights in the vicinity. Most of the key informants (11, or 85%) also were aware of such flights.

K.2.2.2 *Annoyance*

Four respondents (33.3%) were highly annoyed with at least one aspect of the flights—a moderate impact. Three (25%) were highly annoyed by aircraft noise, by the altitude of the flights, and by the possibility of an aircraft accident. None was highly annoyed by the presence of the flights.

Four respondents (33.3%) reported low annoyance with the flights on all four variables. Eleven (91%) reported low annoyance with the presence of the flights, 8 (66.7%) with the altitude, 7 (58.3%) with the possibility of an aircraft accident, and 5 (41.7%) with aircraft noise.

K.2.2.3 *Interrupted activities*

Activity disruption constituted a moderate impact since one-quarter of the respondents (3) reported sleep interruption or interruption of three or more non-sleep activities during the previous month. One respondent (8.3%) reported sleep disruption. One respondent reported the interruption of four, 2 respondents (16.7%) reported the interruption of five, and no respondents reported the interruption of more than five non-sleep activities. On the other end of the scale, 8 respondents (66.7%) reported no

interruption of non-sleep activities, and 1 reported the interruption of one non-sleep activity.

K.2.2.4 *Community disruption*

None of the local officials and newspaper editors contacted was aware of community disruption resulting from the low altitude flying activities, indicating a negligible impact.

K.2.2.5 *Disturbance of young in group facilities*

Impacts to the very young in group facilities beneath R-6002 apparently are negligible, since none of the key informants had received complaints concerning this issue. Also, no survey respondents indicated that a negative aspect of the flights is that they disturb children.

K.2.2.6 *Reduced livestock productivity*

None of the local officials and newspaper editors contacted were aware of reported losses in productivity from commercial livestock operations beneath R-6002; impacts thus are negligible. Further, none of the survey respondents said they dislike the flights because they disturb animals.

K.2.2.7 *Impact indicators*

None of the respondents surveyed beneath R-6002 had made a formal complaint about the flights. Five respondents (41.6%) reported making informal complaints to friends or family. One of these had complained more than once a month, 1 had complained

between once a month and three times a year, and 3 had complained less than three times a year.

Three respondents (25%) either were opposed or strongly opposed to the flights. At the other end of the scale, 7 respondents (58.3%) either supported or strongly supported the flights, and 2 (16.7%) neither opposed nor supported them.

K.3 NOISE

K.3.1 Resource Description

Human health effects are calculated by using the L_{dnmr} metric for measuring noise as a stressor and potential cause of hypertension in some people.

Using ROUTEMAP, the L_{dnmr} for R-6002 is 75 dB at the center of the range and 74 dB 3 miles from the center (Fig. K.3.1). The maximum SEL at areas of intense activity in R-6002 is 122.7 dB and it is 80.1 dB 3 miles from these areas.

K.3.2 Impact Assessment

Persons living beneath R-6002 are exposed to a day night average noise level considerably above ambient noise levels. With the 75 dB L_{dnmr}, approximately 25% of the affected population are expected to be highly annoyed and complaints to local officials and the local Air Force base might result. With a 75 dB L_{dnmr}, a relative risk of 1.3, i.e., a 30% increase in risk for hypertension, is expected for persons in the most active (noisiest) region of R-6002. This calculation of 75 dB L_{dnmr} is borderline and

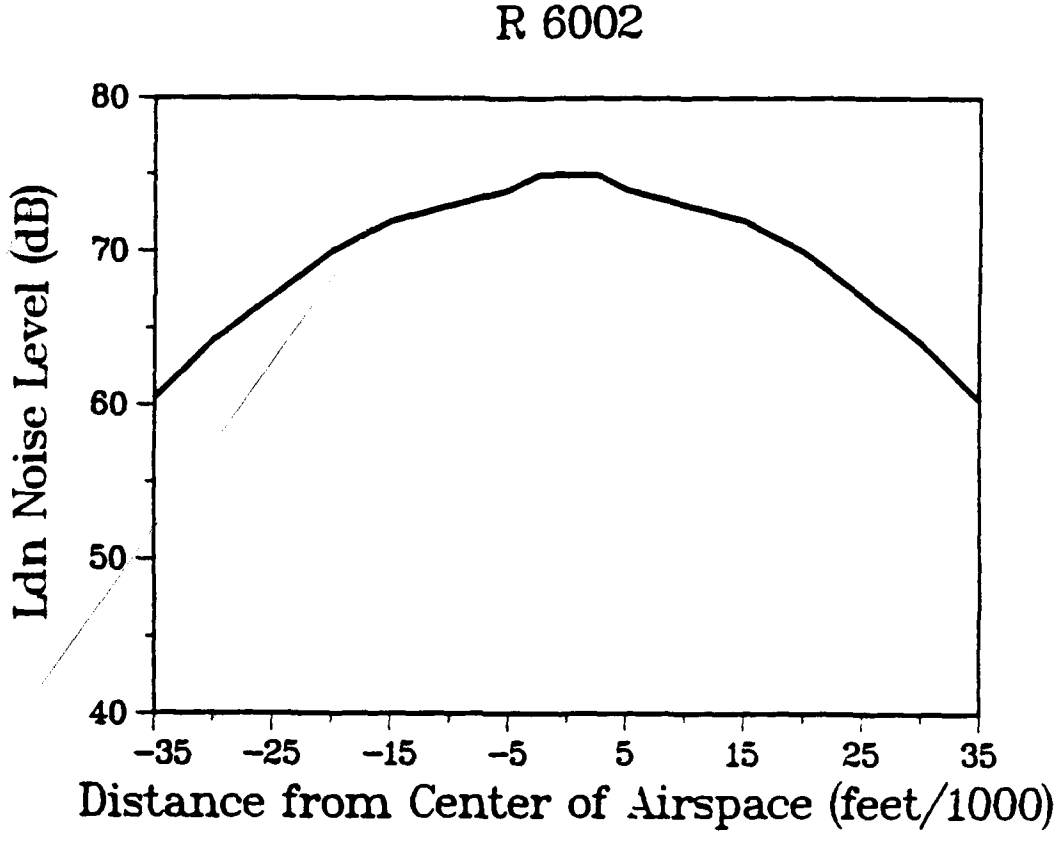


Fig. K.3.1. L_{dnmr} levels for R-6002.

thus the relative risk for the most exposed persons may actually be less than 1.3. Discussions related to the impact levels and their significance are found in Appendix C.

K.4 AMERICAN INDIANS

No sovereign American Indian groups are located under or near R-6002 (Fig. K.4.1).

K.5 STRUCTURES

K.5.1 Resource Description

Typical structures under R-6002 include one and two story frame buildings, one and two story brick buildings (some with external paster walls); mobile homes; frame barns and outbuildings; and prefabricated metal buildings. The building stock is typical of the southeastern coastal states.

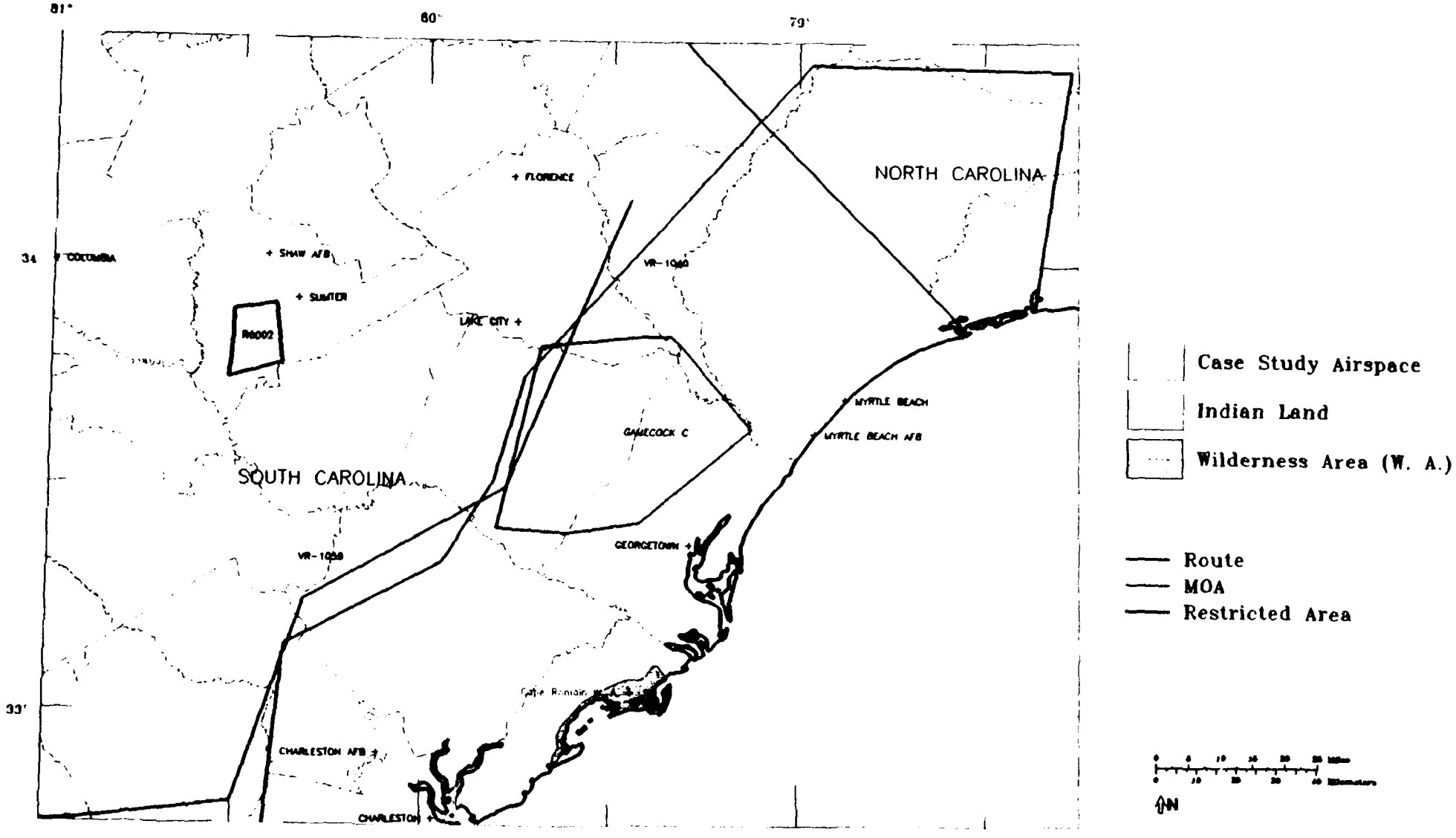
K.5.2 Impact Assessment

Although R-6002 is a high use area, the aircraft which fly in this airspace are considered to be "light" aircraft. As such, based upon GEIS findings (Appendix E), they are not expected to generate acoustical signals at low frequencies with sufficient intensity as to inflict damage on any structures.

K.6 WILDERNESS AND PARKS

No national parks or wilderness areas are under or near R-6002 (Fig. K.4.1).

Fig. K.4.1 Federally protected areas in the R-6002 region.



K.7 WILDLIFE

K.7.1 Resource Description

R-6002 lies immediately west of Gamecock MOA in Sumter county, and involves wildlife resources similar to those described for Gamecock MOA (Sect. H.7.1).

K.7.2 Impact Assessment

Impacts to wildlife resources are the same as described for Gamecock MOA, Sect. H.7.2. Hence, impacts are negligible for endangered species and moderate for other wildlife.

K.8 LIVESTOCK AND POULTRY

K.8.1 Resource Description

Livestock and poultry resources for R-6002 are similar to those described for Gamecock MOA (Sect. H.8.1).

K.8.2 Impact Assessment

Impacts to livestock and poultry resources are the same as described for Gamecock MOA, Sect. H.8.2. Hence, impacts are moderate for poultry and low to negligible for livestock.

K.9 AIR QUALITY

K.9.1 Resource Description

There are no designated NAAQS non-attainment areas in Sumter County, South Carolina, over which R-6002 is located (EPA 1989). There are no PSD Class I areas within 6 miles of R-6002.

K.9.2 Impact Assessment

The air quality impact analysis for Restricted Area 6002 indicated that incremental concentrations of air pollutants from aircraft engine exhaust would be far below levels of concern for the areas overflown. The maximum predicted incremental concentrations for R-6002 were less than 5% of the NAAQS and PSD Class II increments, which are applicable in the areas covered by R-6002. Thus, the air quality impacts of R-6002 are considered to be negligible (Table 4.1.9).

R-2905 A AND B: FLORIDA

L. R-2905 A and B (FLORIDA)

L.1 AIRSPACE

The Tactical Air Command's Restricted Areas R-2905A and R-2905B, established on September 1, 1977, are located in Florida's panhandle near Panama City (Fig. L.1.1). These RAs are scheduled by the Air Defense Weapons Center at Tyndall AFB. R-2905A is located over Bay County, Florida, while R-2905B is located over Bay and Gulf Counties, Florida.

The area beneath R-2905A and B is located in the Coastal Plains region of the United States. The terrain in this part of the state is very flat with little topographic relief, and much of the area is covered by water. However, trees are abundant and can restrict visibility despite the level terrain. There is considerable open beach beneath these RAs.

R-2905A and R-2905B were not established to provide low altitude training for manned aircraft, although the minimum and maximum altitudes are the earth's surface and 1,000 ft MSL. The RAs are used as areas from which to launch target drones. R-2905A covers an area of 21 sq. miles, 13 sq. miles of which is over the Gulf of Mexico. R-2905B covers 33 sq. miles, 17 sq. miles of which is over the Gulf of Mexico. The Air Force may schedule the RAs 24 hrs/day.

Both R-2905A and R-2905B are available for scheduling 24 hrs/day, 7 days/week, but the airspace is used only to launch target drones into the Gulf. Manned aircraft do not fly regularly scheduled training sorties in either R-2905A or R-2905B. There are no other MTRs, SRs, MOAs or RAs which cross or are concurrent with R-2905A or R-2905B. No L_{dnmr} has been calculated.

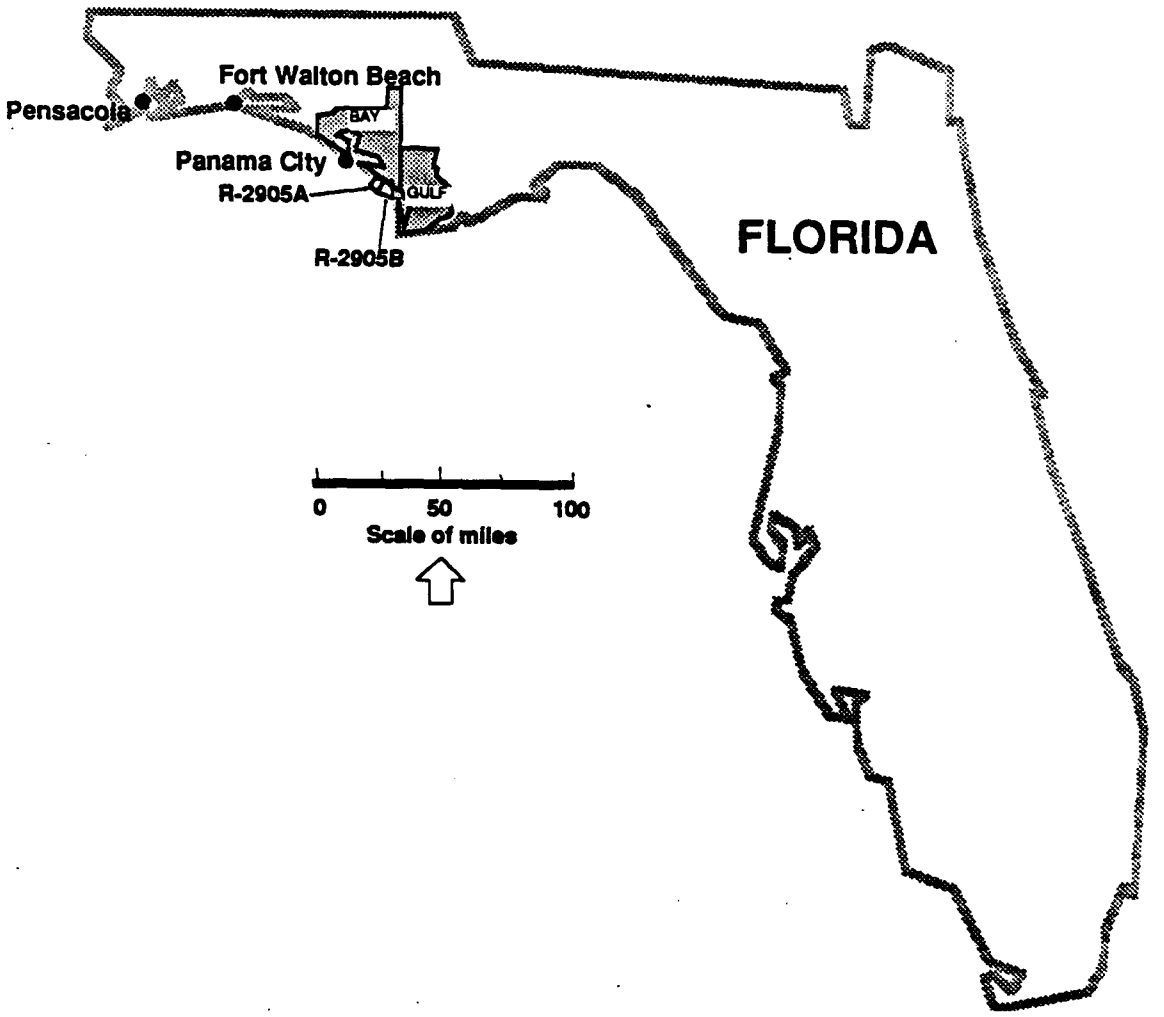


Fig. L.1.1. Map of the R-2905 region.

L2 SOCIAL

There are no permanent residents beneath R-2905 A and B (Fig. L.2.2). No impacts to human activities were identified that can be assessed.

L3 NOISE

No permanent population resides under R-2905 A and B; therefore, no demographic data and associated health effects exist.

L4 AMERICAN INDIANS

No sovereign American Indian groups are under or in the vicinity of R-2905 (Fig. L.4.1).

L5 STRUCTURES

There are no identified civilian structures or structures of historic or archaeologic significance associated with R-2905 A and B.

L6 WILDERNESS AND PARKS

No national parks or wilderness areas are under or in the vicinity of R-2905 (Fig. L.4.1).

Fig. L.2.2 Population distribution in the R-2905 region.

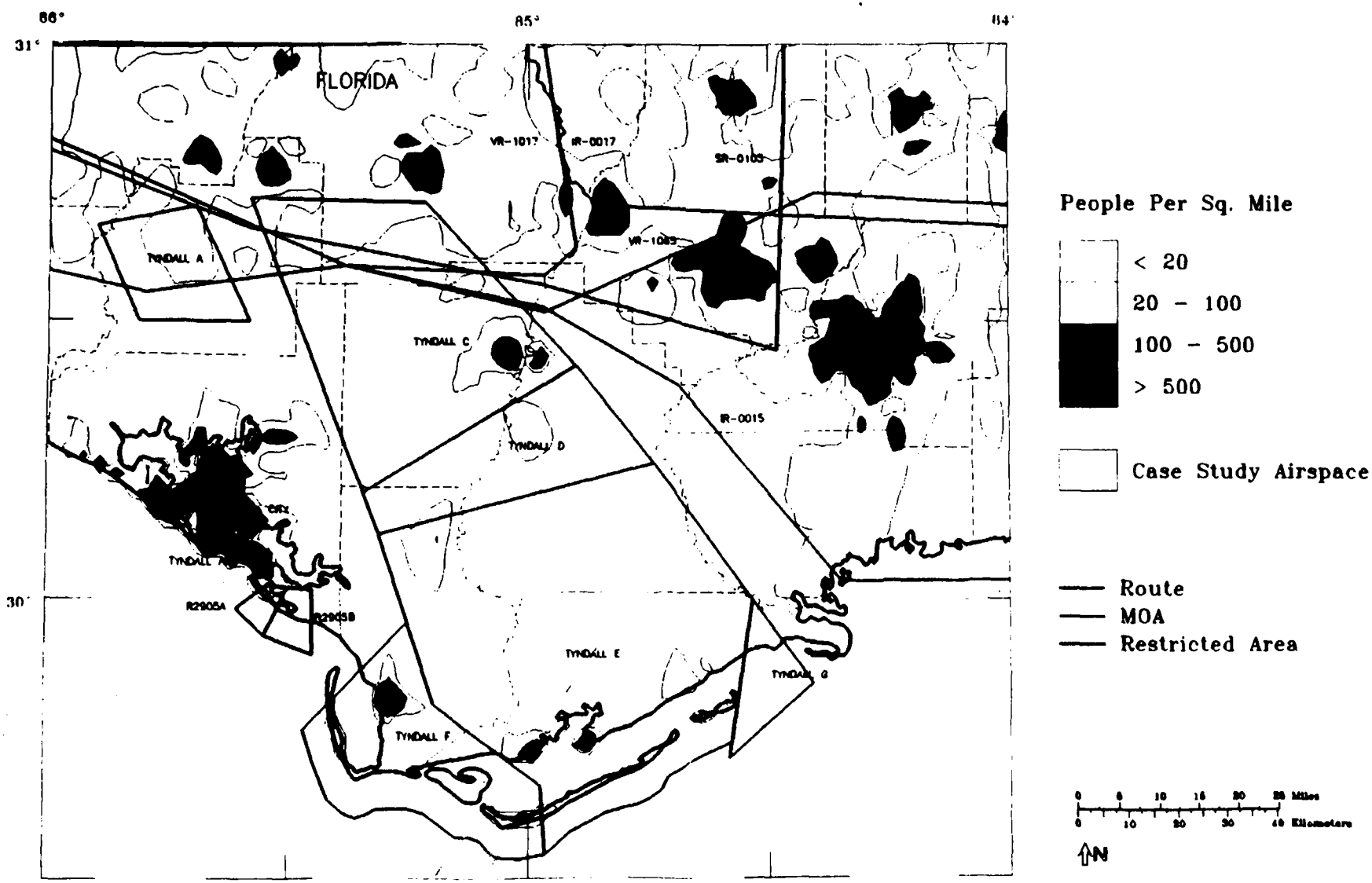
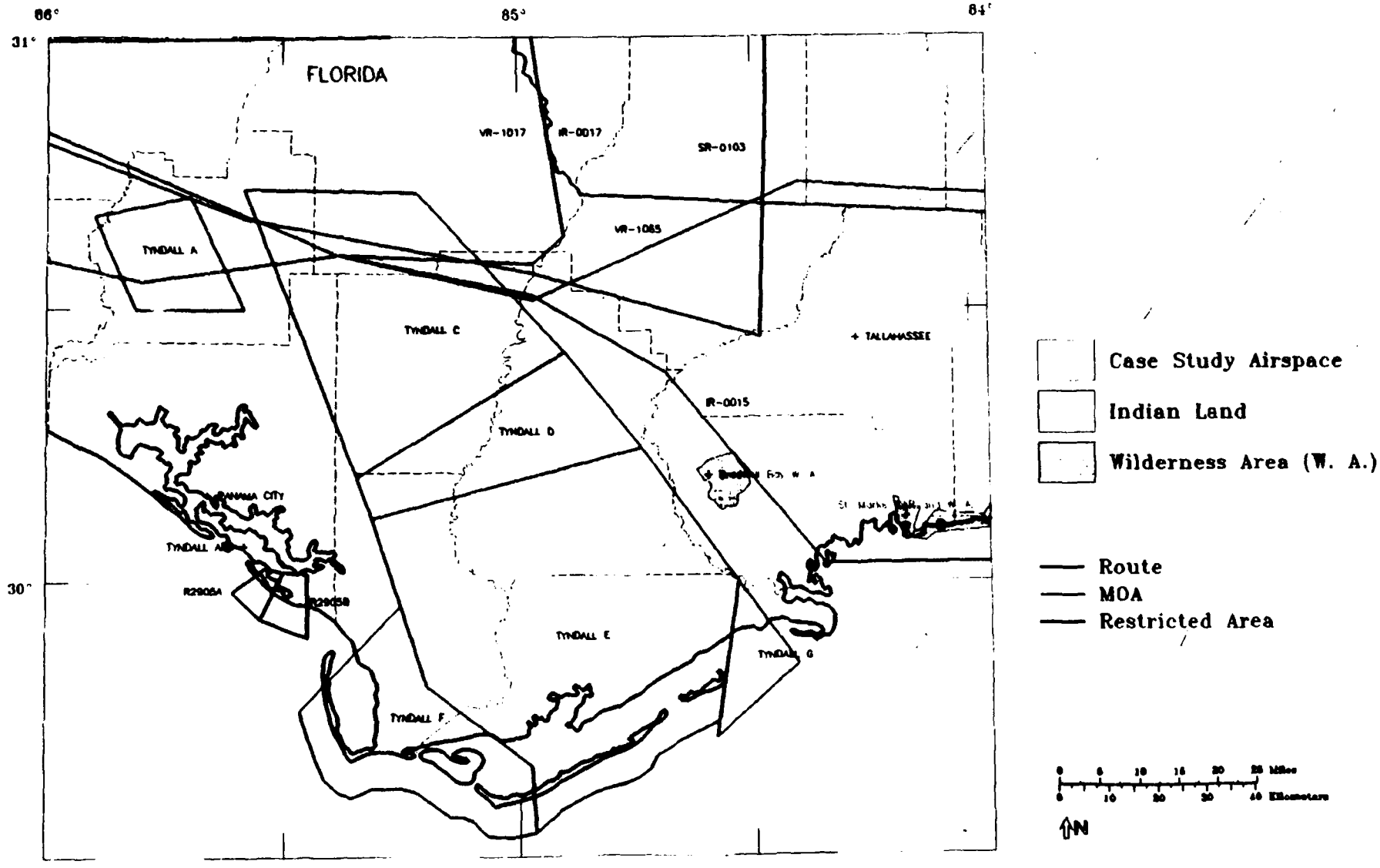


Fig. L.4.1 Federally protected areas in the R-2905 region.



L.7 WILDLIFE

L.7.1 Resource Description

Wildlife resources for R-2905 are similar to those described for Tyndall MOA (Sect. I.7.1), except that R-2905 covers more open water and beach habitat. This difference results in increased likelihood of effects on seabirds and shorebirds (e.g., pelicans, cormorants, terns, and sandpipers), beach mice (Choctawhatchee and Key Perdido), and marine turtles and mammals (Wolfe et al. 1988). Beach habitats overflown may support populations of the state-listed Cuban snowy plover, federally listed Choctawhatchee and Key Perdido beach mice, or nesting federally threatened Atlantic loggerhead sea turtle. Five species of federally listed marine turtles occasionally occur in offshore waters, as do three species of federally listed whales and dolphins (unlisted).

L.7.2 Impact Assessment

Impacts to wildlife resources are the same as described for Tyndall MOA, Sect. I.7.2. In addition to these effects, flights over open water could interfere with sound-based communication by marine mammals and turtles. Hence, impacts are classified as moderate for both endangered species and other wildlife.

L.8 LIVESTOCK AND POULTRY

No agricultural production has been identified to occur under R-2905.

L.9 AIR QUALITY

L.9.1 Resource Description

There are no designated NAAQS non-attainment areas in the counties beneath R-2905 (EPA 1989). There are no PSD Class I areas within 6 miles of R-2905.

L.9.2 Impact Assessment

No dispersion modeling analysis was conducted for Restricted Area 2905. Because this area is used only for launching target drones, the air pollutant emissions and associated impacts are expected to be negligible (Table 4.1.9).

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